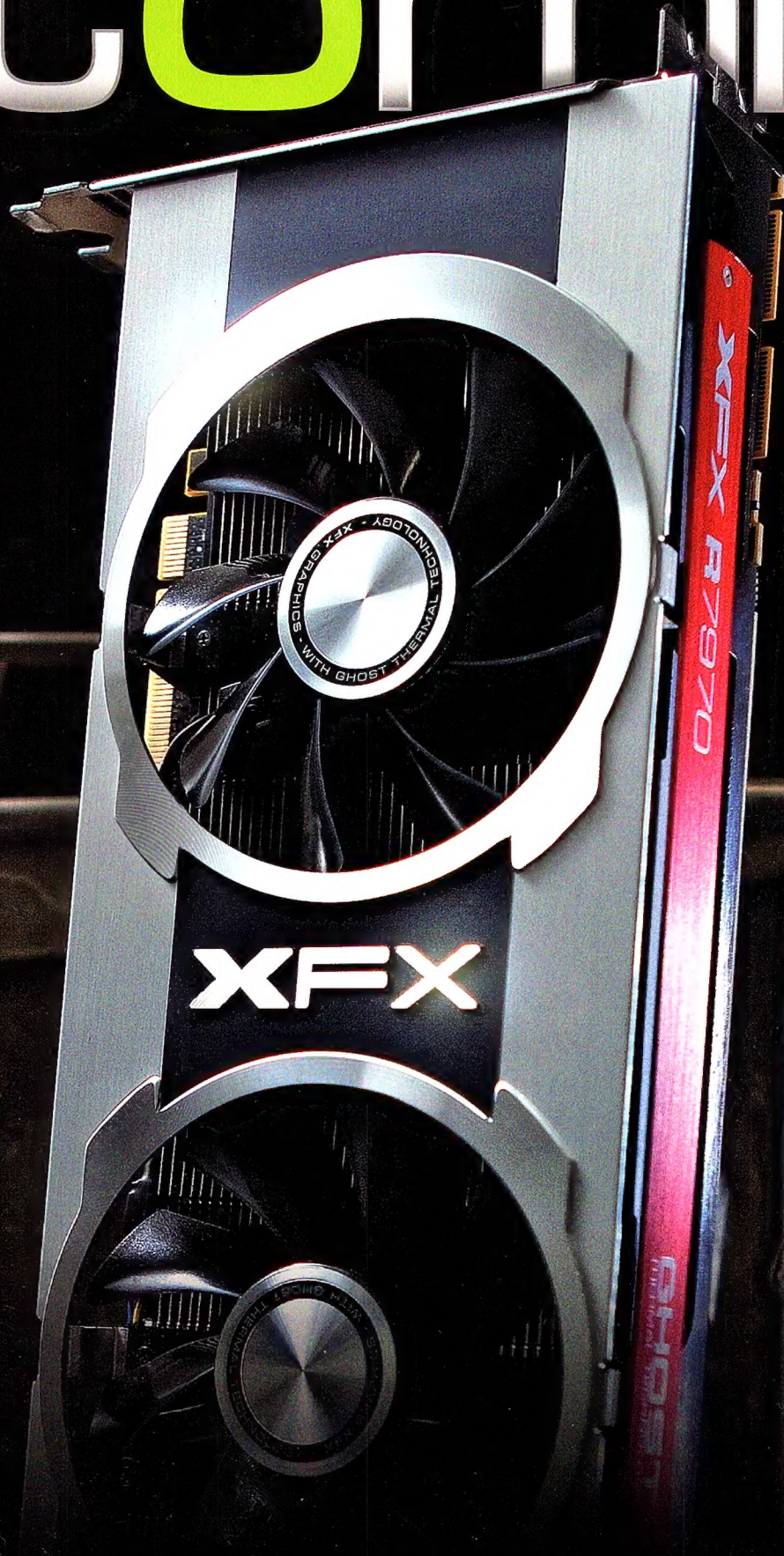


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EDHEAD

Happy days!

I am nothing if not mercurial. Last month, I was sad; sad about feeling somehow honour-bound to wait for the local release of *Star Wars: The Old Republic*.

This month, though - it's all about the shiny happies.

The reason why is pretty simple. If you glance down at what we call, in the industry, the flannel-panel (don't ask), you'll see some new names under the Editorial moniker.



Pretty neat, huh?

Yup, we (for values of 'we' shared with our sister magazine *PC & Tech Authority*) now have a dedicated Labs Team. This, more than anything I can think of in the last little while (even *World of Tanks*) excites me immensely.

For one thing, it signals a change in our content direction. Out licensing agreement with our UK sister magazine is now on hold - from next issue, *Atomic* will once again be 100 per cent Australian (and I'm typing this before Australia Day - celebrate!).

It also means we can welcome a great new writer to the team. Matt Wilson joins us from this issue, and he's a dude. A lover of tech, a gamer, an extreme overclocker, and a maker of fine homebrewed ales. I hope you dig his work this issue, in our in-depth look at the 7970 video card...

And I hope he brings some of his homebrew to work for Friday beers!

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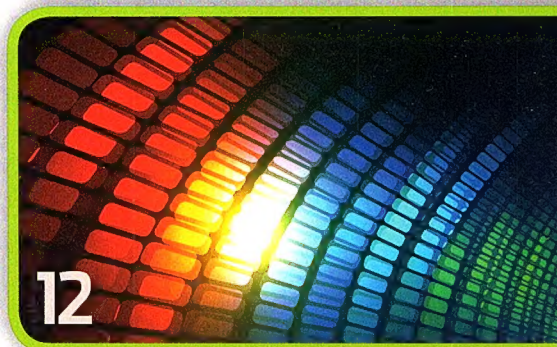
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Max Payne 3 release date(s) announced

The iconic action hero is returning to the PC (and hitting up the Xbox and PS3). Max Payne is back, and angrier than ever! But he is late...

Max Payne, that comic-book-styled, leather-coating-wearing, painkiller-chugging action hero is coming back. Well, that's kinda old news, now, but we at least know when he's coming back - this March!

Well, no. The game's been pushed back, to May. Sorta.

Sadly, it's a bit of a staggered release. It'll be out on Xbox and PS3 on the 15th of May in the US, and then internationally on the 18th of the same month. PC fans have a longer wait, however. Max is hitting his home platform on the 29th of May in the US, while international types ("waves") will get the PC version on the 1st of June.

We contacted Rockstar to find out just why the wait, and were told "It's what we always do."

Regardless, it's good to know when the Bullet Time starts, but the wait is a little disappointing.



Razer's Project Fiona tablet - missing the point on an epic scale

Razer's 'PC Gaming is Not Dead' slogan may sound like it's on our side, but Project Fiona turns out to be platform that's anything but PC.

Razer's officially announced its new tablet at CES in Las Vegas, and to say the device is underwhelming is an understatement.

Razer's calling the mysteriously named Project Fiona a 'PC Gaming Tablet'. Sure, it's got a Core i7 processor stashed in its slim case, but that does not a PC make. Once you go the tablet route, you more or less give up in PC gaming; sure, it can run the games, but they're being shoe-horned into a device that relies on a hybrid touch/control stick interface.

You may as well call a PSP a PC if that's how you're defining the platform.

So what does Project Fiona offer? You've got two controllers on either side of the tablet, each with four buttons, a thumbstick, a shoulder button and a trigger. The display offers multi-touch capacity, and the device has an accelerometer so you can wave it around. This, in Razer's own words, is a "PC gaming user interface designed for a tablet form factor". But here's Razer's take.

"While multi-touch screens have become the de facto user interface for tablets, they are not the right interface for serious PC gaming," said Min-Liang Tan, CEO, Razer, in today's release. "The user interface we have designed for Project Fiona allows all

existing PC games to be played right out of the box and also provides game developers new opportunities as they develop next-gen games on a highly-intuitive platform. Both developers and gamers are going to love the new user interface that combines the best of a gamepad, multi-touch screen and accelerometers for an all-new gaming experience on-the-go."

I'd contend that even Fiona isn't the right interface for 'serious' gaming. Especially not in a multiplayer environment.

Imagine trying to play a PvP match in World of Warcraft using this device - up against someone playing on keyboard and mouse, you may as well just log out before things get embarrassing. The same would go for any shooter, such as BF3. Not that we think Fiona could really run BF3 - if you have a look at all the shots in the Razer gallery for the product, they're not exactly using ground-breaking graphics.

The thing is, if Razer hadn't pushed this is its idea of PC gaming, we'd likely feel more generous. But for a company that has relied on true PC gaming peripherals for its bread and butter - that is, mice and keyboards - it's a terribly off the mark product.



Here we are again, kind of sorta technically the first POTM for the new year (it's along story). Thankfully, we've still been paying attention (more or less - or, at least been making OTHER PEOPLE pay attention) to the awesomeness on the forums.

Thus... Our Post of the Month, the maker of which earns themselves a shiny prize from our generous partners at Razer. But forget the byumpf - who wins?

Twinkle! Who makes an awesome video for 2011 - A year in gaming. Nice work, my tasty man!

<http://forums.atomicmpc.com.au/index.php?showtopic=47049&st=0>

Of course, we also have a runner up, almost as worthy (don't applaud too loud):

Khiraqeq makes us feel better about our jobs by comparing the daily grind to the XP grind of MMORPGs!

<http://forums.atomicmpc.com.au/index.php?showtopic=47106&st=20&p=946375&entry946375>

Remember, you can have your chance - just join the Atomic forums and be a part of the community!



MODIFICATION

With Ashton "Two mods are better than one" Mills.

OFPWH40k

Game Operation Flashpoint
URL www.moddb.com/mods/morrowind-rebirth

If a mod's got 40k in the title it can mean only one thing – it's going to be good. Well, or at least violent. And what better vehicle for this violence than a strategic first person shooter, and the vast detailed engine that it entails, such as Operation Flashpoint? Thusly exists the OPFPWH40k mod, a labour of love – or perhaps intense hatred, depending who you claim allegiance to – to play in your own 40k sandbox with everything from the smallest of the small, such as your trusty Bolter, to the rather enigmatically large Titans.

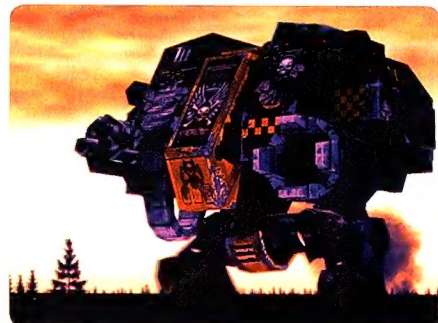
The mod sports Loyalist Marines and Chaos Marines, Imperial Guard and Chaos Guard, as well as Eldar, Dark Eldar, Tau, Necrons and of course Orks. Most of the maps included are 100m square islands for free-form play, and the modding team behind it have even added single player, multiplayer and campaign missions.

Being based on OFP it does create some limits – the engine is showing its age and vehicles with turrets, even though the model may have more than one, can only fire from one turret. Still, OFP's ability to deliver large-scale battles on huge maps makes it ideal for a 40K mod.

So much work has been put into the models, textures and scripting that, even though it's always a work in progress, any 40K fan would be remiss not to check it out. Note that the download links see the Summary tab on the Moddb page, as for some reason the authors aren't using Moddb's file services, with the download dropping in at a hefty 450MB. For



servers to play on, aside from setting up your own, check the 'latest news' tab, also on the Moddb page, which was last updated at the end of December last year, so there's still an active community (see s1.zetaboard.com for the mod's forums too).



Last days of the Third Age

Game Mount & Blade
URL www.moddb.com/mods/the-last-days

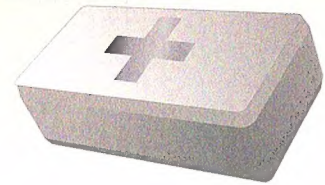
If there's another great franchise to play in, it's The Lord Of The Rings, and what better game to do so than Mount & Blade? This underrated game is one of the few that features excellent sword fighting combat and, of course, combat from horseback (didn't get that from the title?), which is perfect for a mod based on Tolkien's imaginative works.

On that note, the authors make very clear that Last Days of the Third Age is an adaptation from the novels, not Peter Jackson's (epic) movies. This means the look of some of the protagonists like Uruk-Hai is a little different, and Hollywood liberties in various weapons and armour that are not true-to-lore won't be found. What you will get, however, is the opportunity to participate in a vast sandbox world filled with the races of Men,



Elves, Dwarves, Orcs and of course Uruk-Hai. Each faction has its own strengths and weaknesses, and there's a huge range of custom-made weaponry to fit the lore.

Unlike the original Mount & Blade, the war can be won or lost with each faction changing in its strength rating depending



Arma 2

- Patch v1.11

Driver San Francisco

- Patch v1.04


Heroes of Might & Magic VI

- Patch v1.2.1

Operation Flashpoint: Red River

- Patch v1.2

on the results of battles. When strength drops low enough, cities and camps can be besieged and, as a natural progression, victory can be had by storming the capital.

For such an ambitious project it's not without its bugs, but this is true of most mods (not to mention most games). But this is a small price to pay to be able to experience the War of the Ring as an Elven Warrior, a captain of Rohan, or even as an Orc Marauder. Be sure to grab the latest 3.0 to 3.0.1 patch and get into it! 



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Mass Effect Playing Cards

Price: \$US4.99 Website: www.thinkgeek.com

So, you've got a Normandy scale model on your desk at work, and your favourite piece of clothing is your N7 hoodie (which you can now make Shepard wear in game, with the right pre-order!), and if you're really one to show off your fandom, then you'll want this, a deck of Mass Effect playing cards.

And why not? The game has a lot of great characters and art, so if you play a lot of poker, you may as well be looking at Miranda, right? And the cards are wonderfully designed, with every symbol, number and logo looking just perfect.

However, if you do play some Mass Effect-themed poker, we recommend never bluffing against Jack. She always seems to know...

Lexar Professional 1000x CF card

Price: TBC Website: <http://au.lexar.com>

If you're serious about photography, then you'll be seriously impressed with this epically spacious, and uber-epically FAST compact flash card.

Lexar's Professional 1000x CF card comes in a mess of sizes, but really, if you're the kind of guy or gal (we're open minded here at Atomic) who wants a card this fast, then you may as well opt for the 128GB model from the get-go. If that seems like overkill though (pahl), then the card goes down to 16GB varieties, with other sizes in between.

But it's not the size that's the killer - it's that 1000x transfer speed. You can capture 20MB worth of video a second, and transfer it off in no time flat. In this HD and even 3D media age, that's pretty big stuff. The card will be available in April and probably not cheap, so start saving now.



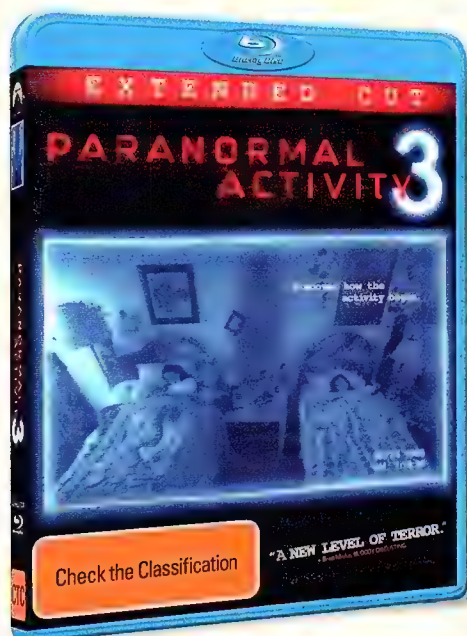


NETGEAR Powerline 500 Nano

Price: TBC **Website:** www.netgear.com

Sometimes it's easy to string a mess of Cat5 cable through your home, connecting up computer room, TV set, and random devices over the local network. After all, WiFi is neat and all, but it can often get in the way of, say, gaming and streaming media. But for the times you want wired connections, and want to feel like a grown up and not have thick blue ropes hanging from every surface: cue powerline networking, and NETGEAR's upcoming Powerline 500 Nano range.

These little boxes are like magic. They work over your existing electrical cabling, all neatly run in your walls and ceiling. So you can plug one in near your modem, and the rest around the home, and there you have it – a working, wired, and unobtrusive network. The Powerline 500 Nano gear was announced at CES and is coming to Australia later in the year; it boasts 500mbps speeds, almost zero setup time, low latency, built-in security and handy energy saving features.



Paranormal Activity 3

Price: \$49.95 **Website:** www.paranormalmovie.com

Fans of horror and 'found footage' cinema have the perfect blend in the Paranormal Activity series – they're like a classic children's panto, all about screaming 'they're behind you!' madly at the screen. Except, in this case it's not a venerable British actor in drag, but rather some kind of horrible, psychopathic force from beyond the grave, scaring the pants off of both the characters in the film and anyone watching.

Paranormal Activity 3 is out this month, and the Blu-ray edition is pretty speccy. You get an extended version of the film, as well as the theatrical cut (there's a whole 13 minutes of extra scare!), plus extras like a 'scare montage.'

'Cause that's just what you need to watch after the film, right?

Patriot PBO Alpine media player

Price: TBC **Website:** <http://patriotmemory.com>

It seems to be the thing that if you're in the storage business, sooner or later you want to start making products that complement the platters and bits of silicon that let your customers store movies and music, and actually give them something that plays it, too. Makes sense, really, but it's an ever-more crowded market, so differentiating your player is tough work.

Patriot's solution is a produce the PBO Alpine Media Player. As the name suggests, it utilises the Android mobile OS to power its device, running off an ARM926 processor. Even better, the player's designed from the ground-up with user-developed applications in mind, so this open platform could get really interesting indeed. On top of that, it supports pretty much every file format you could want to watch something in, including H.264 and .MKV, looks pretty nice (for a small black square, anyway), and has SD card and USB stick support.





Center and track left...

Jake Carroll looks into assistive technologies that help us talk with our computers.

Companies at CES 2012 showed a lot of interest in voice recognition, assistance and control. As much as many of us would rather put it down to a sign of the time, a great deal of market hype has been generated by Apple's Siri technology. Calling it Apple's technology might be a little dubious however, given that the technology is actually a result of around 40 years of research at DARPA into assistive real time technologies.

That's why we felt that there was no better time than now to deep-dive into the technology, and detail more complex aspects of assistive technologies like Siri.

Not magic – just science

You will find technical journalists the world over who will expound the virtues of Apple's 'magical' interface that allows a user to effectively have a two-way conversation with a device to get things done. Yet other journalists will deride such a sentiment, suggesting that true innovation has not taken place and these wonderfully presented user experiences are just rehashed tools engineered to feel nice.

We appreciate the pragmatic and scientific approach. It is what it is. Markets speak for themselves.

Irrespective of what we believe or what markets dictate to the consumer, what has been worked on for many years at DARPA and other organisations in more recent times has culminated in the ability for a human to interact

with a computer using natural, conversational language. The concept behind assistive devices is that they help us out in our everyday tasks as relatively sentient beings, rather than having us 'drive' them as we would a normal window manager, command line interface or GUI browser. This has been characterised in popular science fiction for the entirety of the 20th and 21st centuries thus far with references to artificially intelligent computer beings such as HAL 9000 from Arthur C. Clarke's *Space Odyssey* saga and the far less high brow KITT, from *Knight Rider* in the early 1980s. We then see a plethora of references to assistive devices close to home; with faux-robotic assistants lending a hand on our very own locally produced 'Good Game Spawn Point'.

So it would seem there is a certain romance that we have with our computers, tools and gadgets helping us out with our everyday lives as a friend would do.

Apple (and others) used the results of DARPA's Cognitive Agent that Learns and Organises program, known as CALO. This was an unprecedented build up of collaboration between Carnegie Mellon University, The Institute of Human and Machine Cognition, Oregon State University and Stanford University.

This technology as it is presented to us in our consumer devices uses several core concepts to deliver the user experience we're now familiar with. These concepts are:

- Understanding/processing natural language
- Machine learning
- Evidential reasoning
- Probabilistic reasoning
- Ontology

We'll talk about these concepts (obscure as some of them are), as they are core to all of the functions we find available to us in this new generation of personal assistive devices.

Understanding/processing natural language

Voice recognition software has been around for many years now. It's not a revolutionary idea, nor is it particularly difficult to achieve given the huge power of computing in this day and age. Natural Language Processing (NLP) is the branch of computer science that has gone into creating the skill or ability of computers to understand the things we say in order to carry out tasks. Natural language understanding is often referred to as an 'Artificial Intelligence-Complete' problem as it requires an extensive and deep knowledge of the outside real world, as well as an ability to manipulate it.

The concept of NLP is often argued in academic circles as being a duplicated term or synonym for computational linguistics. The truth is that it's a matter of experience.

NLP started its journey in the 1950s. The widely accepted father of Artificial Intelligence,

Alan Turing published the journal article "Computing Machinery and Intelligence", and in this article Turing proposed what is now known as the Turing Test, as a marker or means of measurement for artificial intelligence (A.I.). As most people are aware, the criterion developed required that the computer undergoing the test to respond in a 'human-like' way in conversation with a real human in real time. The idea was that the computer could pass the test by communicating back to the human judge (on the other side of the conversation) without the

Up until the 1980s, most of these NLP systems were based on exceedingly complex sets of hand written rules. That changed at the beginning of the decade with the introduction of machine learning algorithms. These algorithms could only be afforded to us on the basis that we had a steady rise in computing power thanks to Moore's law. Experts in the field drifted away from decision tree based AI (hard classed inflexible if-then statements), and worked further towards the use of statistics in the natural language to create more soft answers, with

(say, scrapes from web pages) to feed a body of knowledge to learn from. It could be thought of in the same way as a child going to school and being 'taught' by its teacher how to spell and count correctly, but then going home and reading books or browsing the Internet and figuring things out of itself. Within all of this, machine learning is implicit and the techniques discussed above, such as the basic decision trees through to weighted averages and statistical inference for results or problem lookups are implicit to NLP.

It could be thought of in the same way as a child going to school and being 'taught' by its teacher how to spell and count correctly...

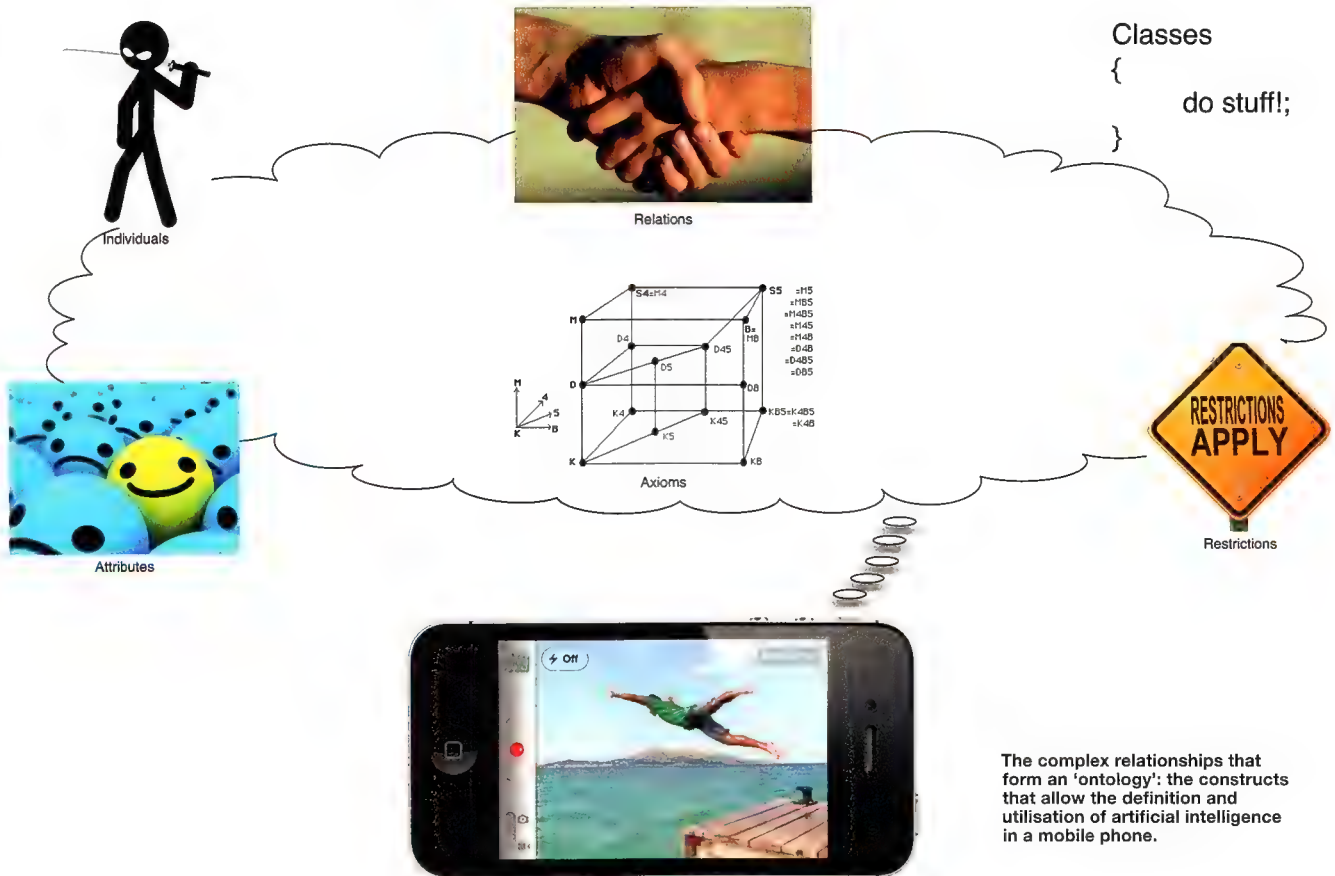
human being aware that the responses were coming from a computer at all. After about 1966, several reports were published suggesting the progress of natural language processing and translation had been far slower than expected and the majority of funding for such projects was discontinued. It was not until the 1980s that research would begin again in any heavily backed or significantly funded way. A new term was coined, known as SMT or Statistical Machine Translation.

confidence intervals. Many of the technologies we see today (including Siri) utilise what is known as the cached-language-model, which applies weights and confidence numbers to the language we use with these tools. It ultimately results in a much more accurate response or translation with unknown input.

The most recent cutting edge research involves unsupervised learning algorithms, where the data these intelligent systems use comes from hand-coded and random data

Evidentially, it's reasoning

Evidential reasoning (ER) is an evidence-based multi-criteria decision analysis (MCDA) approach to dealing with the kinds of complex problems that have qualitative and quantitative inputs, which include things such as ignorance and randomness. If this sounds familiar, it's because that is what we, as humans, do in a nutshell. When you ask your phone to tell you the time in Womanhattan and it asks you if you actually meant Manhattan, there is a good chance it's seen through your absolute stupidity, randomness or just plain ignorance based upon the use of ER. This concept uses a belief structure to model assessment with uncertainty. Technologies such as our personal assistants need to reply on a set of rules or a 'bible' of evidential reasoning in order to keep themselves



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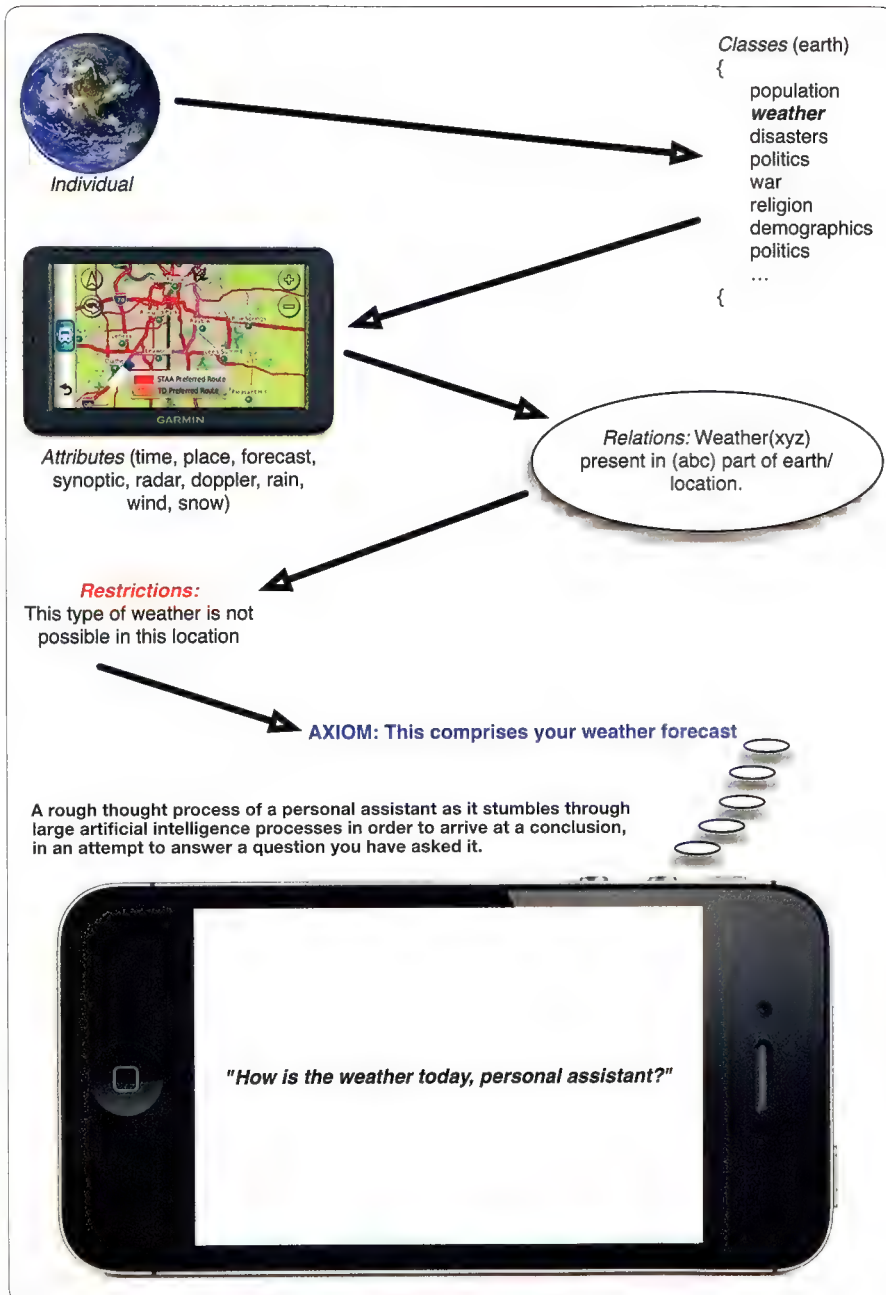
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of deductive reasoning. In theory, marrying these two concepts together isn't that complicated. We do it every day of our lives. An example might be crossing the road. We know, based upon certain times of day and the patterns observed, that there is more traffic at other times than others. To that end, we can use deductive reasoning to attain 'safer' times to cross the road than others, linked to external factors (school home time, office workers leaving and holiday periods for example). Your personal assistant is no different in its capabilities to deduce these results from statistics it already has and the logic of the environmental inputs it has been fed.

The biggest issue and caveat associated with this kind of logic and reasoning is that it has the tendency of multiplying the computational complexity of its probabilistic and logical components, increasing processing time.

Ontology

In what is by far the most complex and philosophical part of how artificial intelligence combines to make something we can 'connect' with, we step foot into the world of ontology. Read this stuff slowly with a cup of green tea.

Ontology (in computer science) represents knowledge as a set of concepts within a domain and the relationship between those concepts. It can be used to form reason or rationale about the objects or the entities inside a domain.

Ontologies are the structural frameworks for organising the information used in artificial intelligence, for our purposes and concerns. In the 1980s, as AI researchers concluded that collecting and organising information about the real world was the key to machine learning en-masse, the community started using the term ontology to refer to the theory of the modeled world and

in-line with our expectations. Namely:

- Falsifiability – it must be possible to conceive of evidence that would prove a claim, answer or result false.
- Logic – any argument offered as evidence in support of any other claim must be sound.
- Comprehensiveness – evidence offered in support of a claim or result must be exhaustive, and all available evidence must be considered.
- Honesty – evidence offered in support of a claim or result must be evaluated without self-deception.
- Replicability – If the evidence for any

claim or result is based upon synthesis or experimentation, it must be proven that it is not coincidental and can be obtained again.

Yes, your phone really is doing all that in a roundabout way when you ask it where the nearest McDonalds is. It won't tell you not to eat it, but it does know it isn't good for you. It's not your personal assistants' job to suggest you that you're going to get fat and unhealthy from eating such products. (Well, that's not its job yet). Give it time and it'll know your BMI, your hydration percentage, weight, and foolish spending habits.

Probabilistic reasoning

The concept of probabilistic logic combines the theory and statistics of probability with the logic

components of knowledge systems.

To our not-so-humble smart phones, these ontologies are totally opaque concepts when they are in the process of interacting with us; we are completely unaware of the constructs that guide them and make them behave in the way we expect. The components that make up an ontology (and thus the expected behaviours that produce the artificial intelligence we are accustomed to) are numerous.

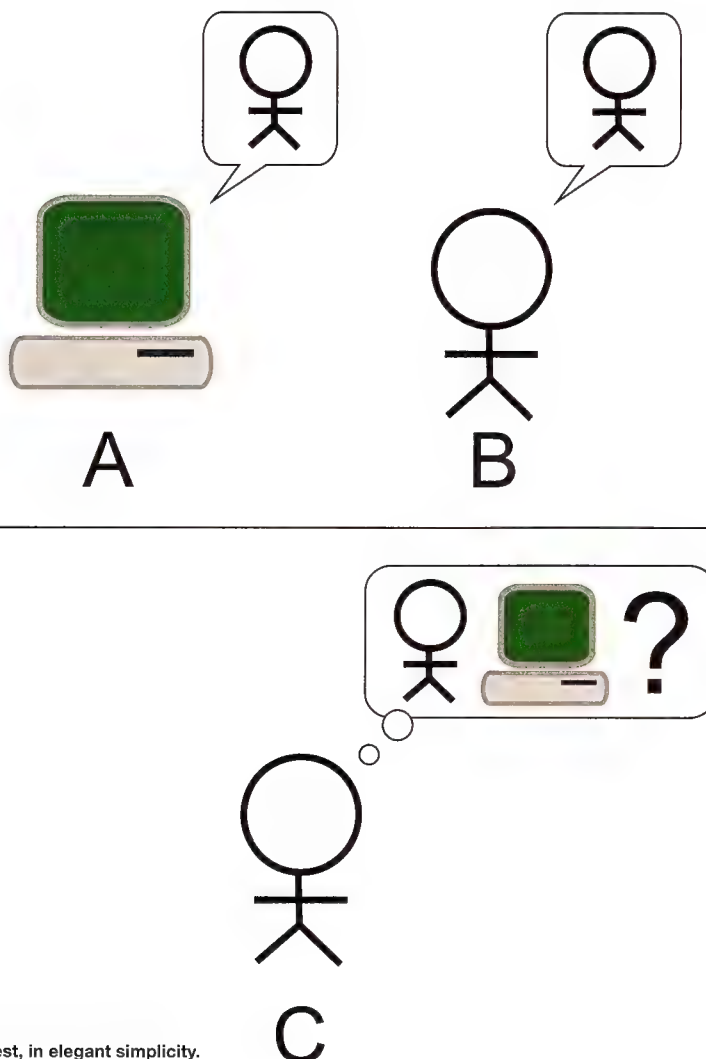
Baffling, bizarre and abstract as these objects might seem at first, when described together with a context, they all make sense.

- Individuals are instances or objects. They are the basic building blocks of an ontology. They can be a person, subject, place, situation or most any real world concept.

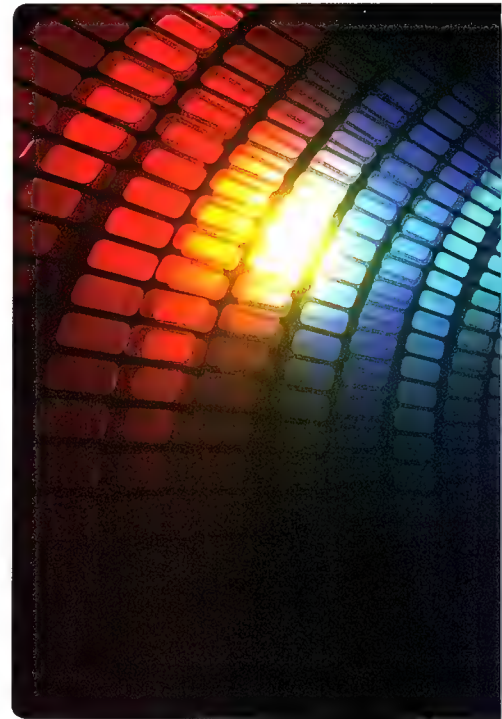
- Classes are the programmatic sense when coding, but the collections, sets and kinds of things that make up a real world object.
- Attributes are the aspects or particular things that make up the characteristics of an object and live within the classes themselves.
- Relations are the ways in which individuals and classes are related to each other. A city may have many buildings and a building many windows, for example.
- Restrictions are the formally stated rules that must be satisfied for user input to be validated and made sense of.
- Axioms are the overall assertions and logical form that comprise the ontology itself.

For any of you budding computer science students or object-oriented programmers: yes,

AI researchers concluded that collecting and organising information about the real world was the key to machine learning en-masse.



The Turing test, in elegant simplicity.




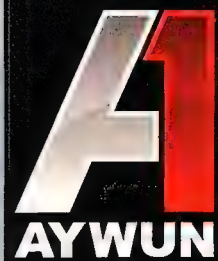
this is almost a replica of the OO model. The reality of ontology engineering is that it relies heavily on accurately reproducing the real world by modelling objects. To do that, object oriented design principles lend themselves well.

The big picture of little things thinking for us

This was never going to be about you chatting to a phone and it tossing you back witty one-liners. It was always about artificial intelligence.

The important take-away this month (if there is one, and you feel like taking it away for your later neural enrichment) is that with the age of complexity we are dwelling in, the concept of 'coding' and 'programming' artificial intelligence has become less and less of a focus, as the integration, intelligent use of the power our computers have – and the speed at which simple queries can be executed – becomes more important. AI and the immersion in the experience or an interchange between us as humans and our devices as computers doesn't need to be a monolithic computing problem anymore. With the concept of an ontology on our side, AI becomes efficient at breaking problems into discrete chunks that it can reference from anywhere in the cloud of knowledge it can access.

The Turing test proved to us that the only thing that ultimately matters in AI is the ability of the computer to convince us that it is indeed human. At some point, when we're interacting with a computer to achieve a task a human would otherwise do and we can no longer tell the difference (and we're not fussed either way) one has to question the validity and place of computers. 



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INPUTOUTPUT

Dan Rutter brings the answers to your questions like no-one else can.

I/O OF THE MONTH

Give it a new cardpunch and it'll be good as new

I My work got 12 identical boring beige boxes in early 2011, and I don't know what the deal was with the (Samsung, if it matters) hard drives in them, maybe they were all dropped or beaten up in the delivery van or something, but EIGHT of the drives died over the course of the year, and got warrantied with drives that seem OK.

My boss is now upset about how we sent the screwed-up drives back, because apparently it's normal for bad drives to be refurbished, and once they're working again people could easily access our confidential business information that we didn't delete from the drives. The boss says the problem with a lot of bad drives is the stepper motor, and refurbishers often just replace that and the drive comes good.

We could have hit the drives with a hammer or put a drill through them, which would definitely make them un-refurbishable - should we do that in future? Could someone now be reading the emails about football I sent during work hours, because we didn't wreck the drives?

Aidan Holden

O Your boss is slightly out of date; hard drives haven't had stepper motors in them for a long, long time. Stepper motors are useful for all sorts of things, including positioning the heads of an eight-inch hard drive that has a few hundred data tracks per inch. But modern drives have a track density in the hundreds of *thousands* per inch, and use a voice-coil system to position the heads with the necessary fantastic



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degree of accuracy.

Even in the late stepper-motor period (the early 1980s) a 10Mb drive could be a \$1000-plus item, so hard drives were worth fixing, if it was possible. And with much larger tolerances in those old drives, you probably wouldn't need a million-dollar cleanroom to replace a stepper or spindle motor on an ST-506 boat anchor.

Today, though, "refurbishment" for hard drives pretty much doesn't exist. A drive that tests OK might be resold, but one with any problems at all will go in the bin. And it's possible that some bored tech might snoop on your data if the drive's not as dead as you thought, but it's not very likely unless your business is interesting enough to be a target of industrial espionage.

So by all means, pulverise drives you're sending for a warranty replacement, if the place you're sending them to will actually give you a replacement for the now-destroyed drive which you have attached an RMA label to with a nail gun. But don't lose sleep over it.

Two gigabytes of misery

I I've got two 1Gb DDR3 memory modules that seem to be worth what I paid for them, which was nothing. My ASRock 990FX Extreme3 has 2x2Gb modules in the RAM slots 1 and 3, and I just got these two 1Gb modules free from a mate who's upgrading, but when I install them Windows goes nuts. Bluescreens, failure to even start, etc etc.

So I removed the 2Gb modules and installed just the 1Gb ones, and ran Memtest86+ from a thumb drive to test the RAM overnight, and it showed no errors. So I tried booting Windows with just the 1Gb modules, and it went to hell again. Tried putting them in slots 2 and 4 instead of 1 and 2; no good. Put the 2Gb modules back in, all is well again.

I guess that it doesn't matter what Memtest86+ says when the computer obviously doesn't work with those memory modules, but is there some BIOS setting or something that'd make Windows as happy as Memtest? Does Memtest often say bad RAM is good?

Heng Chia

O Generally speaking, if Memtest86+ says RAM is OK, it's OK. But it's not a guarantee. If Memtest says a module is *bad* then it's almost certainly correct, but real-world memory use can do things Memtest doesn't, even in an overnight soak test. There are a lot of ways in which RAM modules can fail to work, and it's impossible to test for all of them.

If everything were fine until you ran a 3D game, for instance, I'd suspect either an actual problem with the RAM, or a flaky power supply, because dipping PSU voltages can cause a very long list of strange problems. Given that you often can't get into Windows at all, though, either your PSU is so flaky that you shouldn't have been able to load up the CPU and graphics card with the *original* RAM without



Unfortunately, you can't just shave 'em.

crashes, or the 1Gb modules have their own problems. If they'd been static-zapped then I'd expect Mementest86+ to show errors, but static-zappage is a disappearing, analogue problem with a considerable range between "completely undamaged" and "utterly broken", so that could be the culprit.

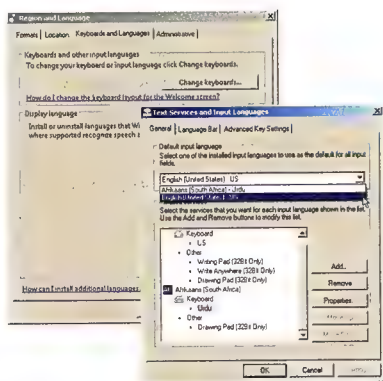
Or they could just not work right on your motherboard. Nowadays, mobo compatibility with different flavours of RAM is generally very good, if of course the RAM meets the specs for the speed you're trying to run it at. But it's still quite possible to find memory that seems to have all the right numbers, yet doesn't work on particular motherboards. ASRock have a memory-compatibility list for the 990FX Extreme3 here: bit.ly/extreme3ram

If the new memory's not on that list, it's entirely possible that it worked in your friend's computer, but won't work in yours, *and* that it shows no Memtest errors.


I'd first try just one module at a time. If one of them is OK and you use it along with your existing 2Gb modules then the motherboard won't be able to use dual-channel mode any more, but the performance loss from that for most tasks is trivially small, and could easily be beaten by the performance gain from another gigabyte of RAM.

If neither module works by itself, I'd then try goosing the voltage up a bit in BIOS setup, and then try turning the RAM (and if necessary CPU) speed down as well. If none of this helped, I'd give up and turn the modules into keyrings.

The quick brown fox
jumped over the ŠĀ^a
ØÊËÿ~ ÔİlÕ

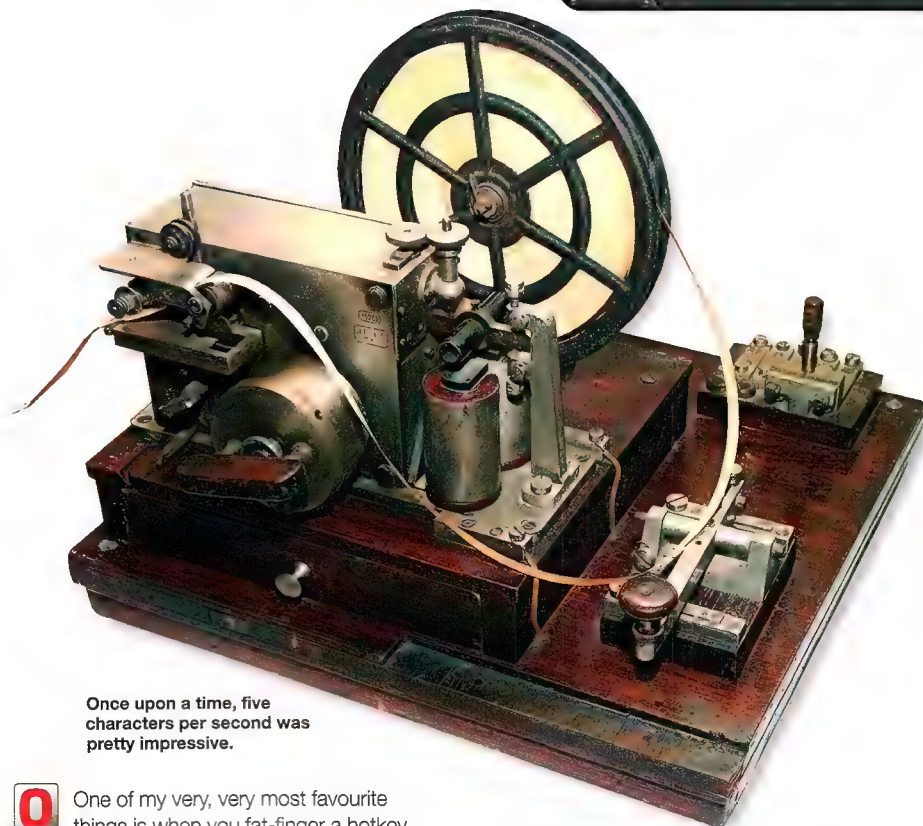


Not that I'm suggesting you do this to your boss's computer, you understand.


 I was typing away a while ago, when I noticed that Z was suddenly where Y used to be, and semicolon and apostrophe were weird accented letters. To cut a long angry story short, my keymap had switched to German, and I figured out how to switch it back in Control Panel (Win7).

Today, it happened again. How? Why? Make it stop!

Quenten L.



Once upon a time, five characters per second was pretty impressive.

 One of my very, very most favourite things is when you fat-finger a hotkey combination and have NO IDEA how you just turned on X special feature of whatever you're using, and don't even know what it's CALLED, and now get to go on a safari through menus and help files to try to figure out how to turn it off again.

You probably have a key combination, by default Control plus Shift, set to change languages, and pressed it by mistake. You have to have more than one language set in “Text Services and Input Languages” for this to do anything, but who among us can say that he hasn’t added a few languages, just for fun, while drunk?


Anyway, get rid of the extra language and you won't be able to switch to it any more.

Some of you may now be wondering how easy it would be to set someone's alternative language to, say, Urdu, set the tell-tale Language Bar to "Hidden", and then set the switch-language key to, say, the space bar. You could probably do that with AutoHotkey or something, but regrettably standard Windows only lets you bind "Switch Input Language" to a few key combinations, and the only single key you can bind it to is "Grave Accent", also known as the backtick/tilde key, in most keymaps.

I'm sorry to say that binding "change language" to backtick does *not* make the computer change language every time the user uses backtick to access the console in a game. But it *does* cause a single press on backtick or shift-backtick to not give you a backtick or a tilde, even if you've only got one language installed. Holding the key down *will*, however, give you a string of the characters when autorepeat kicks in.


See how long it takes your victim to figure *that* one out.

The Teletype Experience

 Yesterday, my computer worked. Today, it won't boot. It doesn't even get to the Windows 7 splash screen, and the standard BIOS screens before that display one character at a time, as if somebody's typing them at about 50 words per minute. I can get into BIOS setup, but it takes several seconds to display each screen in it. It'd be quite interesting if it wasn't so annoying. Menus used to look like this on dial-up BBSes!

Has my 3GHz (Core i5 760, slightly
overclocked) CPU suddenly gone to 3kHz?
WTF?!

William Rangel

 I've never seen this problem in person, but I filed away the answer when I first heard it years ago, and it turned out to work in this case:

Unplug the peripherals. Keyboard, mouse, printer, everything but the power cord. Boot again and see if the computer becomes normal (and complains about the lack of a keyboard). If it does, add peripherals again until you find the culprit. If it doesn't, unplug all of the internal drives, and try again.

This bizarre problem arises when something plugged into the computer starts yammering constantly on some bus that the computer pays attention to early in the boot sequence, and allows to throw CPU interrupts.

In William's case, the demented device turned out to be an inexpensive USB TV tuner. He threw it away, instead of keeping it to install inside the case of a deserving recipient's computer.

I have clearly taught him nothing. (E)



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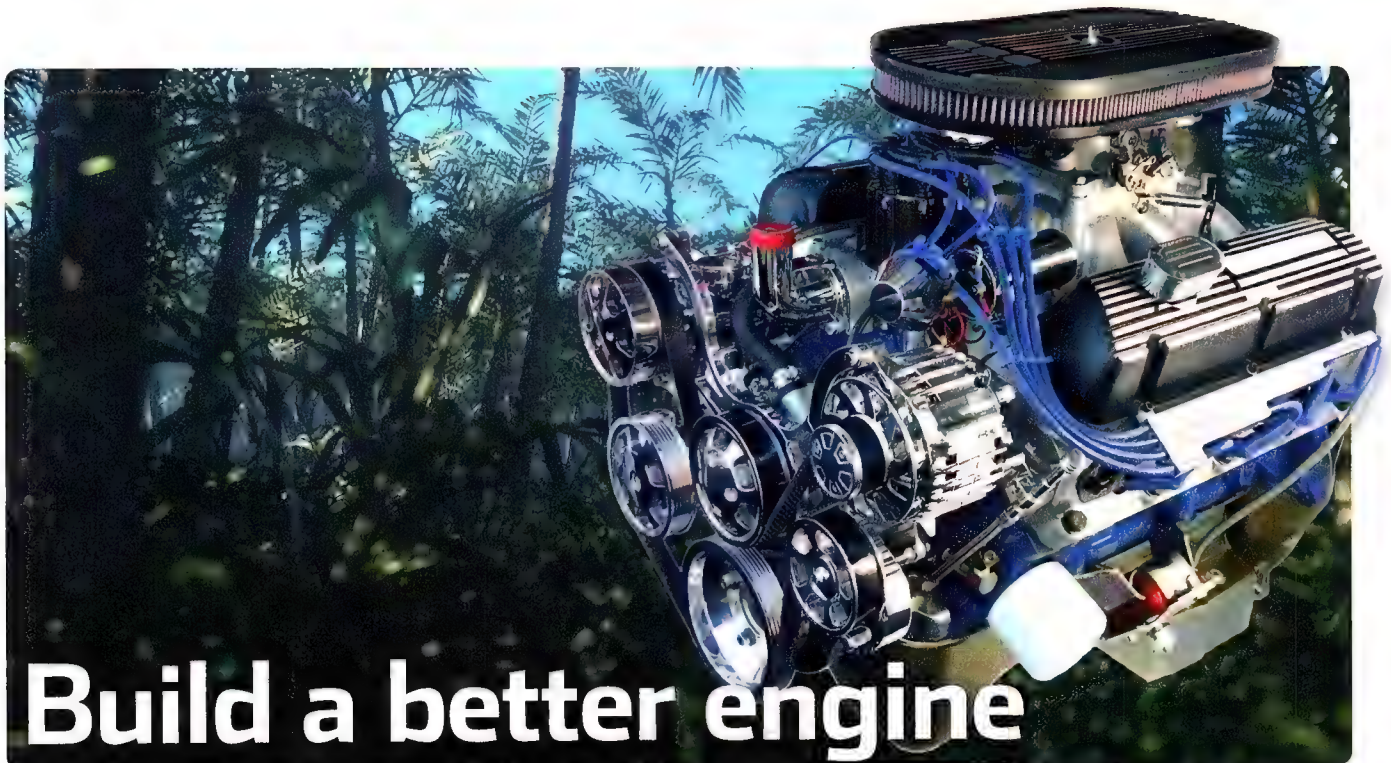
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Build a better engine

Does this game run on regular unleaded?

The popularity of Bethesda's Skyrim has highlighted some of the shortcomings of current generation engines. Skyrim itself is touted to use Bethesda's 'Creation Engine' although, in truth, it's only a patched up version of Gamebryo that's been used going all the way back to Morrowind.

And nothing wrong with that; it works well enough that Skyrim can still look and play fantastically. But it is starting to show its age – just a few examples are the unspeakably bad shadows, particles and specular effects that can sometimes cause lag spikes, and no DX10 or DX11 features to speak of. If TESVI is going to happen, continuing to patch the Gamebryo engine isn't likely to cut it.

But building a new custom engine takes years and a huge investment of capital, which is why many game developers license middleware engines, of which there are quite a number to choose from. Bethesda could do this, and buy a newer engine, but it would also mean re-training staff in entirely new tools and, depending on the engine's capabilities, there's no guarantee Bethesda could make a game like Oblivion, Fallout or Skyrim with its flexibility and depth in areas ranging from environment to NPCs and AI.

Part of the problem is consolitis, because invariably the console market is still two-to-three times larger than PC gaming. That's not to say PC games aren't a market worth servicing; there's still millions of dollars to be made from the PC market as Steam can attest, but it means that the primary focus is usually console-first. Aside from side-effects, like poor console ports to PC (far too many games here deserve a lambasting, but I don't have the whole mag to

service this task) and console-centric features in PC games (like the interface to Skyrim *shakes fist at Bethesda* - it took modders two weeks to make a decent PC interface, why can't you?), it primarily means that the engines du-jour in use by developers at the moment are more often than not targeted at console hardware, which is bordering on grandpa age at the moment (get off my red ring of death, sonny!) and lacking support of modern graphical features that today's PC hardware has been capable of for years.

And until the console hardware platform changes, there's little incentive to change engines. So we see games coming out whose underlying technology hasn't changed in years, and are held back by the limitations of the hardware. But it can't last like this forever.

With PC gaming hardware more than two to three generations ahead of current consoles there is more and more pressure for developers to utilise cutting-edge features not just because it will appeal to the gaming market, but the developers themselves are often itching it to implement games that can't be done with previous generation gear and the engines tailored for them.

It will all change, however, with the arrival of the Xbox 720 (or whatever it will be called) and PlayStation 4, due (it is rumoured) in 2014. Keeping in mind the sometimes years of development AAA games go through, that means launch titles for these platforms are being made now and on engines designed to take full advantage of the hardware. Engines, it's no surprise, that have been developed alongside current generation PC hardware which some PC-only games currently use but

which will really take off when the new consoles finally arrive.

Then, we may still get poor console ports to the PC (replete with retarded controls and interfaces) but at least the technology underlying the games will be taking full advantage of the hardware in your box, and release after release of the latest games will look and play amazing.

I want my TESVI experience to be mind-fuckingly mind-blowing, so this can't come soon enough. ☺

Ashton already runs on the Xbox 1000...
amills@atomicmpc.com.au



TEMPORAL WORLDS in Video Games

Leigh Harris is persistent
about change in game worlds.

It is the ability to interact with a world which sets videogames apart from more traditional forms of media. It is their greatest strength, but oddly, their least-utilised paradigm. The influence one can wield within a game world is predominantly limited to one's immediate surroundings, with lasting effects being relegated to niche subsets of gaming as though they are a gimmick. Rarer still is the blending of lasting effects by the player on a game world within a narrative, but then again, taking infinite possibilities of player agency into account and keeping a coherent narrative is a daunting task, and one which developers can be forgiven for neglecting to tackle.

Allowing change in a game world, however, is a powerful mechanism. Shattering a player's familiarity with a place in a determined fashion can ultimately be one of the most striking ways of reaching a player's emotional core, stressing their bonds of comfort with familiar landscapes, and lurching them back into your pocket.

With such a vast and formidable tool at developers' disposal, how could two flash games demonstrate so thoroughly how radical such tactics are when employed, when they are still largely overlooked in the genre which could use them the most: open-world action/adventure games? We decided to delve a little deeper.



Gone in a Flash

The two flash games in question utilise pseudo-interactive gimmicks that demonstrate flaws in videogame worlds in general. Each game has its strengths, but both rely upon repetition of the same 'level' (for want of a better term), each time adding subtle changes to make the player feel as though they're progressing. Far from making the games themselves feel cheap (a redundant

apartment, down the escalator, into your car, to work, to your desk, and interact with your cubicle to begin your working day.

The game is structured such that the most logical movement always leads you towards the expected goal: your day's work. Any player familiar with platformers will dutifully march rightwards, given the option. When the player finally reaches their cubicle, they've been walking monotonously for up to 3-4 minutes with scant

incentive, so they're frustrated, aching to reach their goal and likely won't walk past their desk to explore when the option to interact finally presents itself.

Sitting at their desk, reaching their goal, the game cuts straight back to the bedroom, alarm clock blaring and the routine beginning anew. They have to test the boundaries of the game world to see what else is available.

They **know** there must be something more to this game than simply traveling to work repeatedly; the point of monotony alone is too basic to drive someone to craft an entire game, so what more is there to this world? Thus begins Pederini's comment. You are forced to take less obvious routes, do unexpected things, search corners which are entirely searchable yet hardly obvious, in order to find out what more there is to life than routine work.

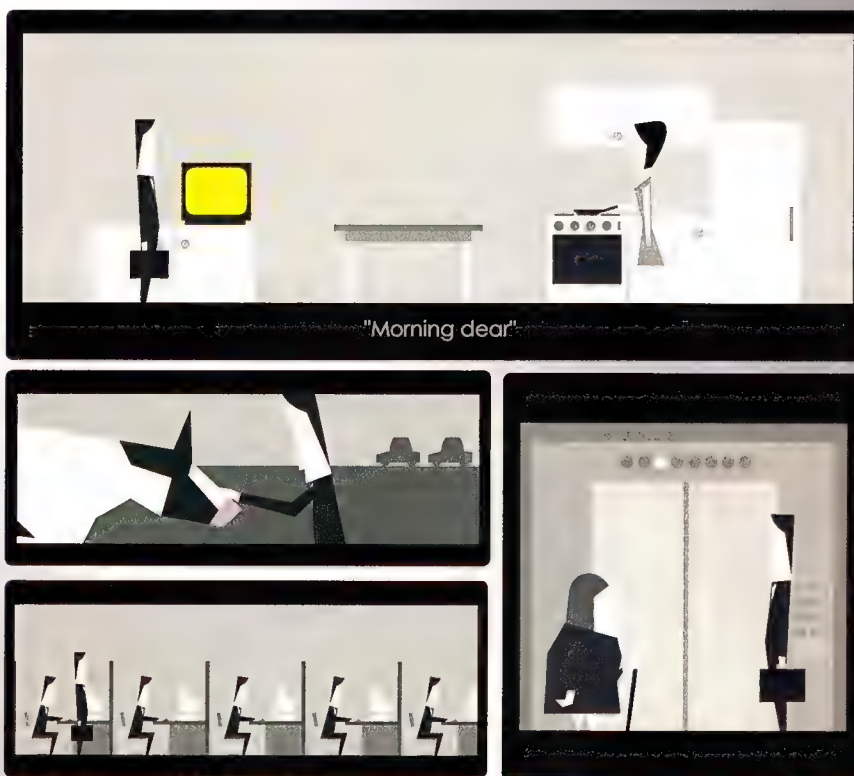
The stark black and white world is so static it makes the single brown leaf on the tree outside your office, slowly flapping in the breeze, become the greatest friend your character has. The game specifically uses familiarity to cause anxiety.

The second game, arguably somewhat derivative of *Every Day The Same Dream*, is called *One Chance*, by Awkward Silence Games (2010). Much like *Every Day The Same Dream*, the player operates a simple left and right 2D game mechanic, and is only able to interact using the space bar. The player must also navigate the same rather plain game world (with no sense of challenge) five full times before the game ends.

On each pass through the game, the world in *One Chance* is one day closer to its end. The player knows this from the outset. The protagonist is a scientist (a plain white male scientist) who has created a cancer cure. His cure has been unleashed onto the public and unexpectedly eradicates all living cells, rather than just cancerous ones. Time is running out.

Harnessing this fairly stereotypical technophobic plotline, the game changes its

Every Day The Same Dream



notion anyway, considering they're both free flash-based games that can be played online for nix), they invoke a feeling of urgency, of a malleable world, and of a sense of importance for the player which is often missing from larger game-worlds.

We strongly suggest you play both games. Each is 5 minutes long, both can be played in a browser and both are highly recommended. They are *Every Day The Same Dream* (<http://tinyurl.com/samedream>) and *One Chance* (<http://tinyurl.com/onechancegame>).

On the small scale

Paolo Pederini created *Every Day The Same Dream* in 2009. In it, players assume the role of a faceless 2D polygonal man. He lacks any definition, and exists in a bleak and despondent world with restrictive controls to match (left, right and 'interact' options only). You awaken in your bedroom and must make your way out of the



landscape each day to represent an ever more decayed world. Fruit falls off trees, grass turns brown, the wife and child of our hero seem less and less invested in life, and the journey to work is progressively more riddled with evidence of rioting and a wilted enthusiasm for existence.

Decisions with impact

Rather than employing the cunning railroading mechanic from *Every Day The Same Dream*, *One Chance* instead makes player choice obvious, but asks them to exercise their own judgment. Do they stay at home, knowing that

Through both games, we can see a subtle shift in a physical space representing time, imparting a huge onus of responsibility on the player, constantly forcing them to re-evaluate their position in an otherwise familiar world.

The AAA conundrum

The space-race of size, graphical beauty and weapon counts in videogames has not come to an end. We still see 2009's *Borderlands* from Gearbox Software boasting about having 16 million weapons, 2010's *Red Dead Redemption* from Rockstar San Diego creating

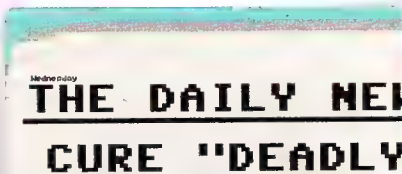
Through both games, we can see a subtle shift in a physical space representing time, imparting a huge onus of responsibility on the player

they only have a few days left with their family, or do they go to work anyhow on the off chance that maybe their co-workers are wrong and there is indeed a cure? Do they indulge in the pleasures of a flirtatious exchange at work, with repercussions being inevitably naught, or remain faithful to their wife? These decisions each result in the end of the 'day' being played, and the day ends as you go to bed, ready for the player to see what the world looks like the next day and be given another choice.

a dumbfoundingly large play environment with every nook and cranny hand-crafted, and the depth of side-quests and player-driven occupations in 2011's *The Elder Scrolls V: Skyrim* being without peer.

What these massive games could learn from *One Chance* and its ilk is the power of change within a known environment. It takes little more than an alteration of the location of a family member, an apple having dropped from a tree, a co-worker in a different place or even

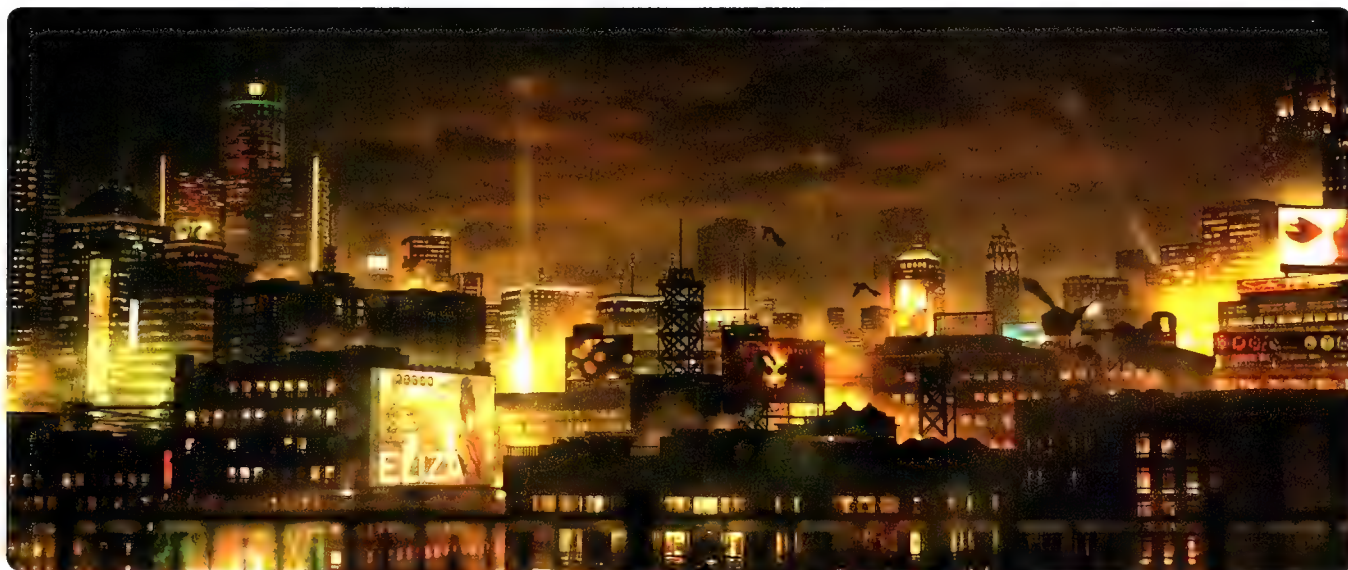
One Chance



The cancer cure discovered earlier this week as been found to be "beyond deadly", according to officials.

E48K15 doesn't stop at only killing cancer cells, the drug goes on to kill every other living cell in not only the human body, but everything else. If the gas based drug was ever used it could go on to cause catastrophic damage to the Earth.





a slightly longer beard on a character to imbue *One Chance's* world with the sense that it is growing and evolving, and little more than a few yes-or-no decisions to make the player feel like that chance is at their behest. As such, there is a palpable excitement to it that larger open worlds can fail to match.

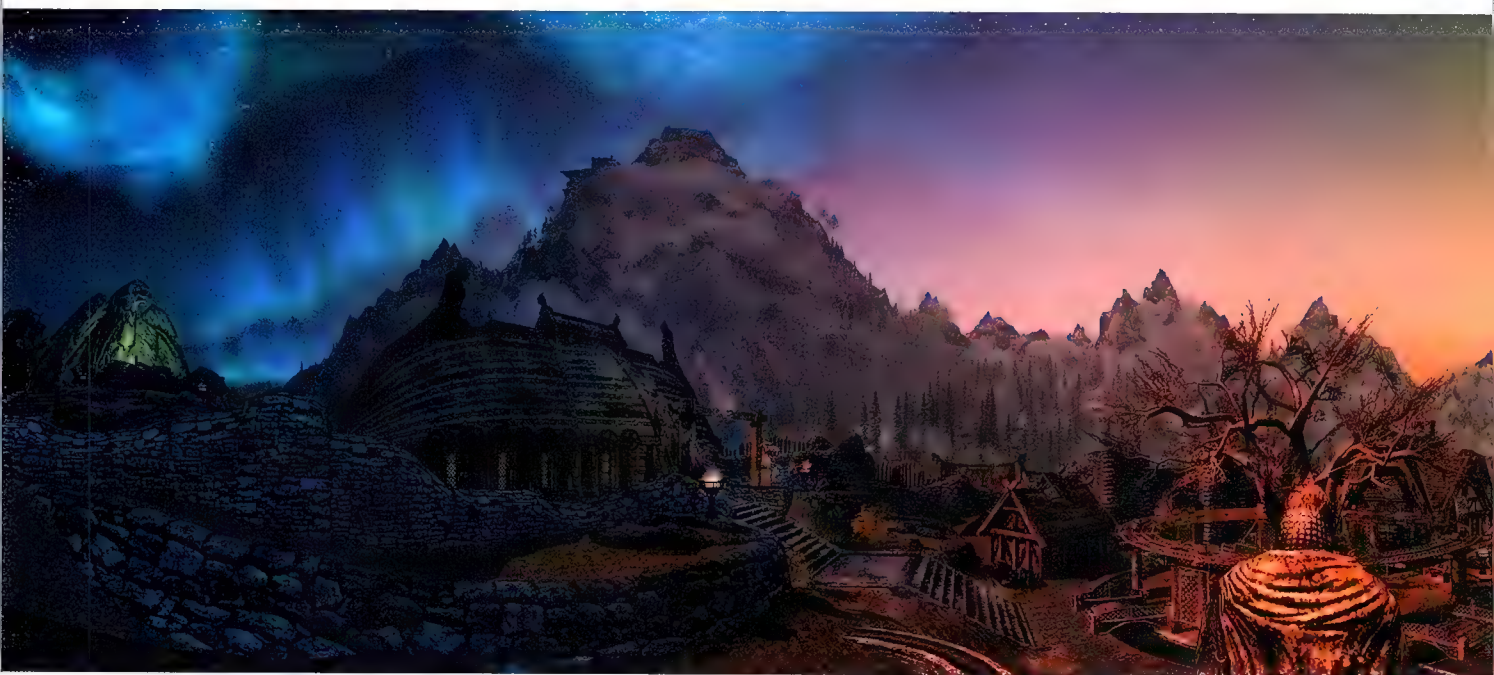
It's a matter of scale. *Red Dead Redemption's* game world was the most reactive yet in an open-world action game. Boxes could be smashed, dynamite exploded, citizens would run and scream in panic, the time of day changes with the weather beautifully, and gangs would take the law into their own hands well after a player commits a crime, giving the illusion of a self-interacting and changing world the player cannot see. It is, however, merely small-scale illusion. The impressive reactivity of

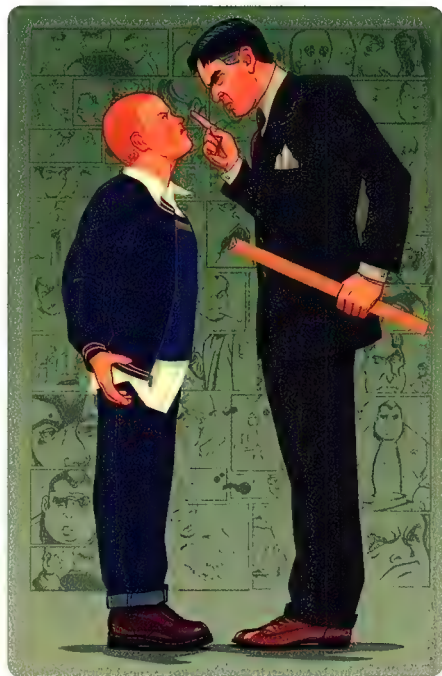
The impressive reactivity of the game world perfectly allowed suspension of disbelief, but the effects of almost all activity was temporary.

the game world perfectly allowed suspension of disbelief, but the effects of almost all activity was temporary. Boxes would re-appear, citizens would resume their daily lives, the days would come and go like clockwork, but by and large, the most real change a player could hope for was progression through the narrative or a hefty bounty on their head resulting in a few more randomly-generated threats on their life.

Rockstar Vancouver's 2006 title *Bully* (named *Canis Canem Edit* in Australia) simulated change on a larger scale, and stands as perhaps one of

the best examples of progression in time in an open-world action game to date. The game took place over the course of one school year, replete with seasonal changes in which characters the player had come to know would be seen wearing different clothing, would all have unique things to say about the weather, their attitudes towards protagonist Jimmy Hopkins would alter according to the plot, and Jimmy would be spoken to in increasingly familiar tones as the year went on. These minute changes made the player feel that their existence in a predominantly





static world was active, vibrant and changing, even within the realm of a fixed narrative.

We're all friends here

What good is it to familiarise a player with a section of an open world, only to have them move on to the next section and render the original area redundant? Well, the value of exploration cannot be understated. An entirely new environment is a grand reward for having completed a portion of a game. New buildings, terrain, characters and events deliver huge visible bonuses to a player who may be feeling a touch stilted with the section of the world they've been meandering about in. It's an



obvious choice to make. If an area is completely abandoned in favour of the new location, however, the point of an open world is lost. Levels being joined together doesn't preclude them from being levels.

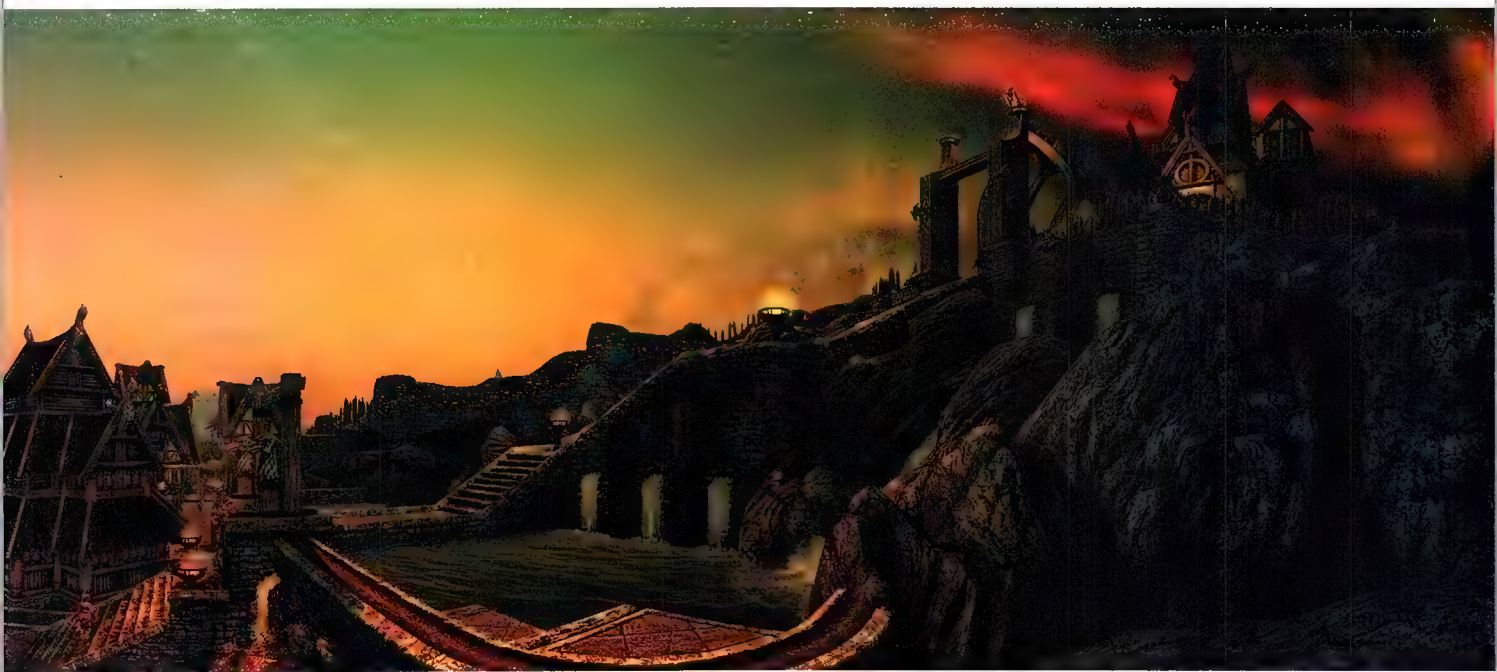
And what happens to that dead patch of game-world, which now lies gathering dust? If a player doesn't return to a part of a world, or worse, returns and sees nothing new or different, the game is wasting valuable familiarity. When there is familiarity and acquaintance, there is an emotional attachment. That can come either in the form of memories of that area, to finding a hard-to-reach hidden package, or just the comfort of knowing where everything is. Regardless of the motivation, that attachment exists, and is there to be taken advantage of.

Dr Malcolm Ryan, research fellow at the school of computer science and engineering at UNSW (and director of the game design lab), highlights the process through *Deus Ex*:

"Human Revolution revisits certain locations with changes, so that you're in an area at one stage exploring, and you later revisit it under martial law. The martial law is an effect of your actions, and the whole area takes on different meaning the second time you visit it because you can no longer just walk on the streets.

"You have to suddenly re-explore the space with a stealth-focused mentality, and it has an entirely different social impact. They didn't quite pull it off; the limited processing budget meant that there weren't quite enough people on the street and there wasn't quite enough variance in the art style to make it believable, but it was still very interesting just how vastly different that same space could become and the impact it could have on the player.

"The example I like is *Die Hard*. It takes a familiar space (an office building) and re-interprets it as a battle zone. And you have to stop and think 'what does this space mean in





this new context?" Games, for a long time, have had the problem that the spaces have been completely meaningless, fighting aliens in some underground complex which doesn't have any significance whatsoever. Many more games now are in realistic places, doing that *Die Hard* re-interpretation."

Essential ingredients

Here are a few things which must be taken into account when figuring out the perfect balance between exposure to the new and the comfort of the known:

Ludo-narrative dissonance

When a game beckons you on a Tolkien-esque quest across a vast landscape, promising many adventures and huge personal character growth along the way, it often follows that a significant amount of time is implied to have passed while you've been away. Returning to an environment which is familiar can make a great end to a story; the return home is a powerful meme, but when there is a continuation, what becomes of a supposedly prosperous village? It takes the player drastically out of their investment in the game-world to see a supposedly thriving

town do anything but. The satisfaction of seeing a second story at the local inn is a simple yet effective enough token to warm a player's heart and permit them to go on feeling as though the NPCs have flourished because of their brave protection.

Without a paddle

There is a balance developers are becoming more and more adept at striking as the years go on; the gift of a new environment must be matched to player's desire to explore. Familiarity must find a way to travel with the player (unless the developer has a specific reason to wish the player to feel uneasy during their travels, say for narrative reasons). Familiarity in unknown regions can (or should) be a hook, but its absence should also be utilised with a deft touch to prompt the player to be self-reliant. Both in tandem should always create a slight tension, but a good developer should be able to stretch it too far in either direction to create fear, suspense or confidence in their player.

Re-treading ground

How possible is it really to go over the same patch of road or dirt multiple times and eke out new gameplay? While it can sometimes be worthy of derision (*Halo: Combat Evolved* was notorious for copy-pasted level elements), at other times being au fait with the landscape for a portion of an action sequence (*Burnout*:





Paradise) can be an empowering moment for the player. As any good level designer will tell you, the architecture of a map is a place from which to draw inspiration for the layout of a good firefight, but there is no 'right' way to interpret a situation. Sure, a bank heist might have an obvious point of entry and exit at the outset, but revisiting that same place to do something different or take on a unique role can dramatically change the way a scene plays out. Consider the hundreds of hours which can be wrought from an *inFamous* game in countless missions and side-quests which use the same streets and

the task itself was never-ending prevented that core sense of conquest, and a lack of tie-in with the game's narrative (it was possible to be at the 'low' point in the game's plot while being stupendously rich through these business ventures) continue to hold this style of growth back.

The perfect mix


Dr Ryan continues: "The typical scenario for games is the Star Wars narrative, where you have an unlikely hero living his ordinary life in an ordinary place, and you have some disturbing

thrown into the extraordinary world from the beginning and are never given the opportunity to explore the world in an everyday sense."

The challenge game developers now face is the ability to turn from creating 'more' game world, to adapting existing game spaces for multiple ends. When a game's narrative intends to convey the passage of time, the game world should not only change slowly (perhaps barely noticeably) along with game-progression, but should demonstrate this change through multiple avenues.

The strength games have is their interactivity, and as such the passage of time should be recreated in details, rather than overt demonstrations. If we choose to interact by observing a game-world's machinations and just letting it absorb us, we should be rewarded with the prompts necessary for that absorption.

If a player bumps into someone accidentally in an open world, the NPC reacting to them based on their status as a hero/villain is a great start. When we can see characters reacting – even with the same one-off soundbytes, not necessarily with full conversations – based on events which have transpired in the past (some of which were perhaps influenced by the player), like lamenting the closure of a nearby building, we're getting there. Some major plot points are defined by world-alteration in such great examples in this direction as *Skyrim*, but such instances remain overdelivered and gift-wrapped, where the subtlety of a shifting world remains purely in the realm of NPCs' interactions with the player.

When new buildings can be constructed (not necessarily in real-time and using real-world materials) and NPCs we used to hear nattering about the Gem Saloon are now discussing the Bella Union, we're on the right path. When a developer can deliver a massive shootout in the most familiar of places and have the plot, the action and the pace deliver an edge-of-your-seat action experience, we're on the right path. Perhaps most importantly, when we look back over an open-world and can't quite remember what it used to look like before we got there, we're really on the right path. 

Possibilities for engaging gameplay in the same game-space are endless; it depends on clever level designers to re-purpose spaces...

are only altered by altering the appearance of scripted enemies and objects. Possibilities for engaging gameplay in the same game-space are endless; it depends on clever level designers to re-purpose spaces in a way which doesn't make them feel old or rehearsed.

Genre-bending

The city-builder/strategy-management genre has had a place because players like to see their choices have lasting effects. One of the recurring reasons people point to *Grand Theft Auto: Vice City* (2002) as perennial is the sense of conquest the game delivered. Re-vamping old buildings, spawning new enterprises, you really felt like you were taking over the town. In an attempt to push this further, Rockstar North's *Vice City Stories* introduced an unending mechanic of constructing 'businesses' which they could then upgrade, defend or mix and match (quite similar to more recent *Assassin's Creed* titles). The blatant gameplay focus of this mechanic prevented it from yielding huge success as a standalone pastime, however the thinking behind it demonstrated a keen desire to address a need for tangible change within game worlds. Additionally the player's knowledge that

incident, the call to adventure, where he has to leave that ordinary life and something changes in that place to drive him into the extraordinary world, have his adventures, and return triumphantly to that ordinary life.

"What games miss is that we tend to throw ourselves right into the call to adventure. We're



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HARDWARE

NEWS, REVIEWS AND ROUNDUPS ON THE LATEST HARDWARE

Ever stare at your smartphone (or otherwise portable device) and wonder what goes on inside the processor? No? Oh. Ok then.

Ah hell, we'll tell you anyway – in a big feature on ARM's exciting big.LITTLE design that gives you so many cores, but only lets you use half at any one time. Why'd they do that? Go find out!

Then we've got a duo of X79 motherboards

in the Labs, and the first aftermarket-cooled 7970 in the form of the XFX Black Edition. But we didn't stop there – our new hire Matt Wilson sunk his teeth into the reference design 7970 and has given it a super-focused look from page 43 onwards. Everything you need to know, and probably a lot of stuff you don't.

And also heatsink H2H. Get reading!

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HOW WE TEST

We do a lot of testing in our labs, and we look long and hard at every piece of hardware to determine whether or not it passes muster. From taking a new card out of its packaging, to bundled extras, to performance, every facet of a given piece of kit's 'user experience' is under scrutiny.

In some instances, we have tough benchmarks to help us rate gear. For a CPU or a graphics card, raw performance is, of course, the most vital stat as whether it stinks or smells like roses, as well as the ability to overclock well. But there are other things we pay attention to in the review process.

Value for money is an important consideration, especially in the current financial climate. High end gear is expensive enough as it is, so we look for good bundles. For instance, a graphics card that comes with a game or two, all the cabling you'll need, and little surprises like tools and other bumpf will score higher than a card that costs similar, but doesn't give you any presents.

Build quality is another thing we rate. From a PC case to a motherboard, we like our hardware well-made and capable of a taking a bit of punishment.

A lot of what we look for can be hard to put into numbers, we admit, but we try to think about what any enthusiast would think about their new gear after laying down money for it, installing it, and then using it. Andm, when we do put it into numbers, we consider a score of 75 to represent perfectly adequate kit.

And our benchmarks help, too. We've picked a suite of games and applications that anyone can get access too, so that you – the reader – can easily compare your own gear with the kit we have in each issue. In fact, we'd recommend to all our readers that they run all of these tests on their systems and save the results, so you can always have a familiar benchmark of your own to compare to the latest gear in Atomic.



Our shiny Alienware-powered Gaming Lab, where we do most of our game reviewing and peripheral testing.



CPU Benchmarks:

Hexus PiFast

<http://pifast.hexus.net/pifast.php>

PiFast is a program that essentially calculates pi to a set amount of decimal places. It is a single-threaded application (one core/thread) and we run it at ten million places (10,000,000) using the Chudnovsky method, in the standard mode with no compression, and a FFT length of 1024kb. The program is free, so grab it and run it on your CPU. Memory bandwidth plays a significant role in the final performance of this program, so be sure you bump up the frequency as well as the CPU clock!

wPrime

<http://www.wprime.net/>

"wPrime uses a recursive call of Newton's method for estimating functions", says the website as it attempts to explain in plain English what it does. What it does do is, essentially, complex square rooting and other number functions, which are able to be split up evenly between multiple cores, or simply run on a single core. We use wPrime 32M in both single and multi-threaded runs. The results of the single run are divided by the results of the multi run, and this gives us the efficiency of the CPU being tested – very useful knowledge to have when comparing chips and evaluating the benefits of overclocking.

GPU Benchmarks:

Crysis

<http://www.ea.com/crysis/>

Crysis is one of those games that can scale from Average Joe's rig all the way to the beastly Dream PC in Kitlog; but due to recent graphics card releases we needed to bump it up a notch. Our testing now uses a standardised timedemo run, with all settings on high at a resolution of 2560 x 1600. While we can't run any antialiasing at this res and still get playable framerates on most cards, it's still more than enough to really give cards the workout they truly deserve.

Unigine Heaven 2.1

<http://unigine.com/products/heaven/>

A synthetic benchmark built specifically to harness the latest and most demanding features of DirectX 11, Heaven is one of the best ways to test a card's tessellation capabilities. With a built-in timed run around a fully realised world, this benchmark taxes cards significantly and puts them under serious stresses. We test at a resolution of 1920 x 1200 using 8x MSAA and 8x AF, completing two runs of the built-in benchmark. The first run is with tessellation set to 'extreme'; the other 'none'. This highlights how well the cards can handle DirectX11 features and what they'll be like in a game that doesn't use the effect.

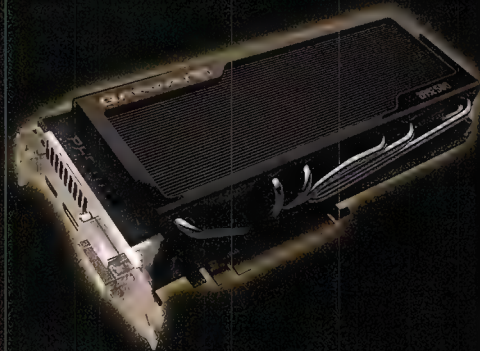
3D Mark 11

<http://www.3dmark.com/3dmark11/>

It really wasn't that long ago that we were introducing readers to 3DMark Vantage, but the relentless pace of hardware creep has led to a whole new benchmark, 3DMark11. Designed to measure a PC's gaming performance this latest version makes extensive use of all the new features in DirectX 11 including tessellation, compute shaders and multi-threading. We test using the Extreme preset, which runs at 1920 x 1080(p); this is designed to push even high-end systems, so we feel it's indicative of exactly the loads Atomiceans expect from their gaming rigs.



GAINWARD

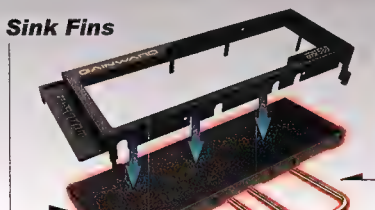


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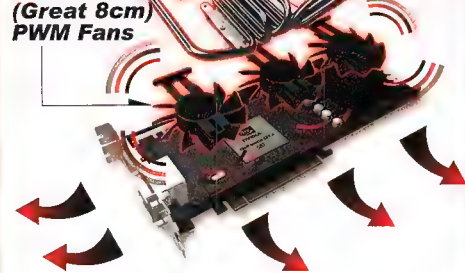


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Inside ARM's **big.LITTLE** processor

Clive Webster takes a look at the next generation of advanced co-processing, mobile devices, and where things are headed in 2012.

If you were to skim-read our recent AMD FX-8150 review (www.atomicmpc.com.au/?278452), you'd be forgiven for thinking that AMD had lost the plot.

You wouldn't be forgiven for merely skim-reading that review, but that's beside the point. The issue is that consumer-level applications don't, and probably can't, thread evenly across multiple cores. Games are a particular problem, because even if you untangle threads such as AI, pathfinding, object collision and physics, you're still left with a mighty main thread that can't be split for fear of losing data coherency.

Intel and AMD approach this problem by using Turbo Boost or Turbo Core to overclock CPU cores dynamically when others are idle, thus allowing the CPU to process largely single-threaded tasks more quickly. ARM's approach to this thorny problem is said (by ARM, admittedly) to be much more efficient. The big.LITTLE design of ARM's forthcoming processor combines a fast, power-sapping processor with a slow, but very low-power one. An interrupt control unit monitors the work created by the operating system and apps, and switches workloads

between the two processors within 20ns. This happens without the operating system knowing anything has happened, other than that it has more processing power and needs to update the battery status.

ARM's big.LITTLE plan sounds both absurdly simple and needlessly complicated, and that's because it's a healthy dose of both. To understand what ARM is up to, you first need to understand its design objectives.

The Nexus

When ARM says that mobile is the 'nexus' for everything it does, it's not referring to Star Trek or the recently released Android smartphone. ARM places mobile use – and primarily use of smartphones rather than tablets – at the centre of its design strategy. Warren East, chief executive

officer, explained that "we always concentrate on mobile when we're doing new developments of microprocessor architectures because mobile is a very demanding environment, in terms of processing performance for [the] amount of power that's available in a handset."

The problem is one of fixed dimensions. Phones can only be so large, and battery technology is only so efficient, but the demand for phones to do more is always

increasing. With finite energy, manufacturers need to find creative ways to deliver performance and battery life. East pointed out that the increase in the amount of data that phones can access – via 3G, 4G and WiFi – has led to increased demand in rich applications and high definition content. However, it's exceptionally hard to create a single CPU that can deliver the performance

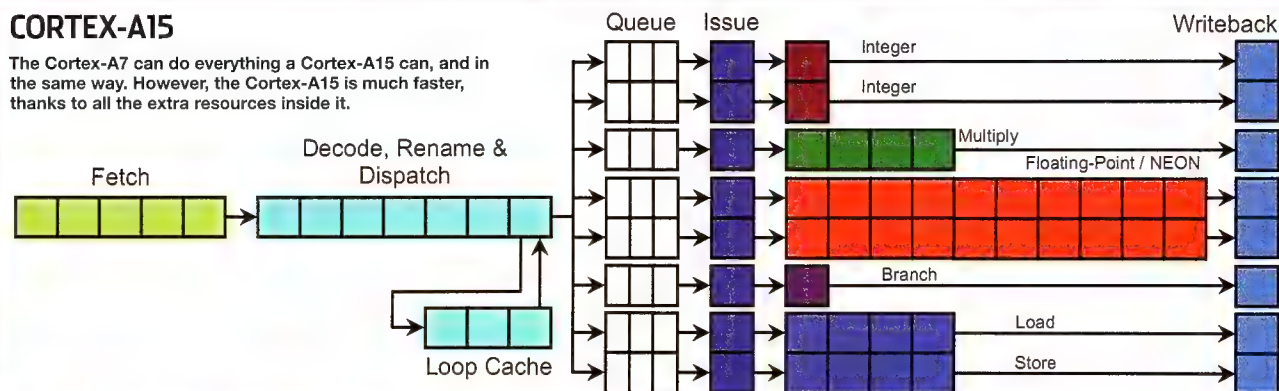
1985

Acorn develops first commercial RISC processor

Intel releases its first 32-bit x86 processor, the 386

CORTEX-A15

The Cortex-A7 can do everything a Cortex-A15 can, and in the same way. However, the Cortex-A15 is much faster, thanks to all the extra resources inside it.



1993

Cirrus Logic and TI license ARM technology.

Intel releases the Pentium, with a built-in floating-point unit.

required to run demanding web pages and high-resolution cameras quickly, while at the same time offering super-low power draw when idle or performing simple tasks.

The Cortex-A15 design, which will feature in so-called superphones and tablets next year, is said to deliver excellent performance. The NVIDIA Kal-El processor is based on the Cortex-A15 design. However, even with only one Cortex-A15 core active but idle, it still consumes much more power than an idle Cortex-A9 device such as the iPhone 4S or ASUS Eee Pad Slider. Advances in battery technology are slow, so ARM is keen to push innovation on the processor front.

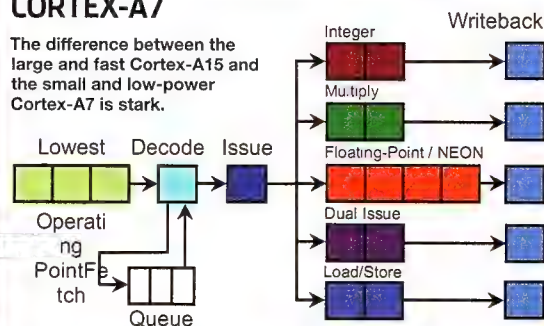
Both Intel and AMD use the idea of underclocking and undervolting to reduce the power draw (SpeedStep and Cool'n'Quiet, respectively). However, ARM is trying to achieve greater power efficiency than mere underclocking can deliver. It also wants to deliver proportionally more performance than Intel and AMD do with their Turbo Boost and Turbo Core technologies. Both technologies aim to deliver more performance to single- and dual-threaded applications by shutting down spare CPU cores to maintain the same overall maximum power draw. ARM wants to provide full-speed dual- or quad-core performance when needed, but miniscule power draw when a CPU

is idle.

This is where the big.LITTLE concept comes in. ARM intends to pair a relatively high-speed (for a smartphone) Cortex-A15 CPU with one of the extremely low-power Cortex-A7 CPUs it announced recently. This is possible thanks to the clever GIC-400 Interrupt Controller and CCI-400 units, which can seamlessly switch code from the powerful Cortex-A15 CPU to the Cortex-A7 CPU without

CORTEX-A7

The difference between the large and fast Cortex-A15 and the small and low-power Cortex-A7 is stark.



The GIC-400 Interrupt Controller and CCI-400 units can seamlessly switch code from the A15 to the A7 CPU without the operating system...

the operating system even knowing. The switch takes less than 20,000 cycles (or 20ns if the CPU is operating at 1GHz), so stuttering shouldn't be an issue either.

Behind the scenes

Switching from one processor to another without the operating system knowing, let alone having to reboot, is trickier than it might seem. The first

and most important requirement is that both CPUs have identical features and architecture.

That doesn't seem to make sense, though: if the CPUs have to be the same, how can they deliver significantly different performance and power draw? And how can you switch between two radically different CPUs on the fly? The answer is in the consistency of ARM's design – both the Cortex-A7 and Cortex-A15 use the full ARMv7A architecture, including large physical address extensions and virtualisation. This means both CPUs process tasks in exactly the same way, although the Cortex-A15 will perform them much faster than the Cortex-A7.

Meanwhile, the Cortex-A7 is sufficient as a mobile network controller or text-based webpage processor without consuming anything like as much power.

The defined feature set of the Cortex-A7 and Cortex-A15 is also similar, which again aids dynamic switching between the two. Both CPUs support single-, dual- and quad-core layouts (they must both have the same number



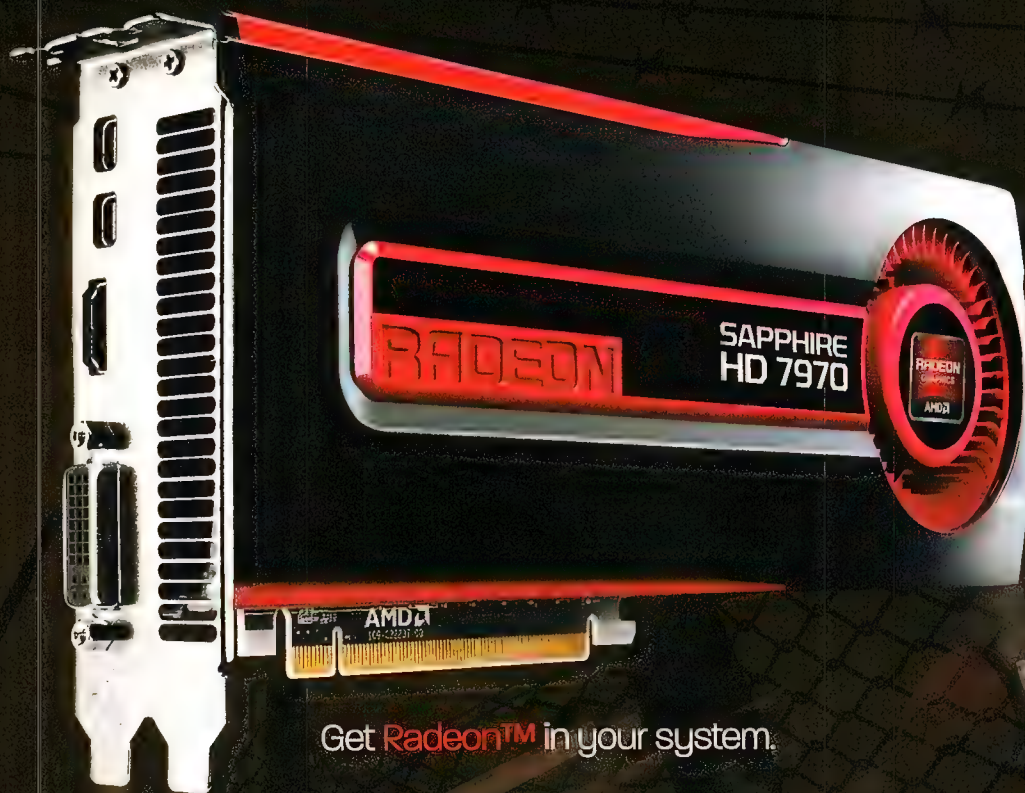
1996

ARM810 introduced; Windows CE supports ARM.

AMD introduces the K5, its first non-Intel clone.

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1999

ARM enters FTSE 100;
ARM9E announced.

AMD launches first Athlon
CPUs; NVIDIA launches first
GeForce GPUs.



of cores for a big.LITTLE setup) and integrate Level 2 cache inside the processing cluster. Both CPU designs connect to the CCI-400 cache coherency controller through a single AMBA 4 coherent interface.

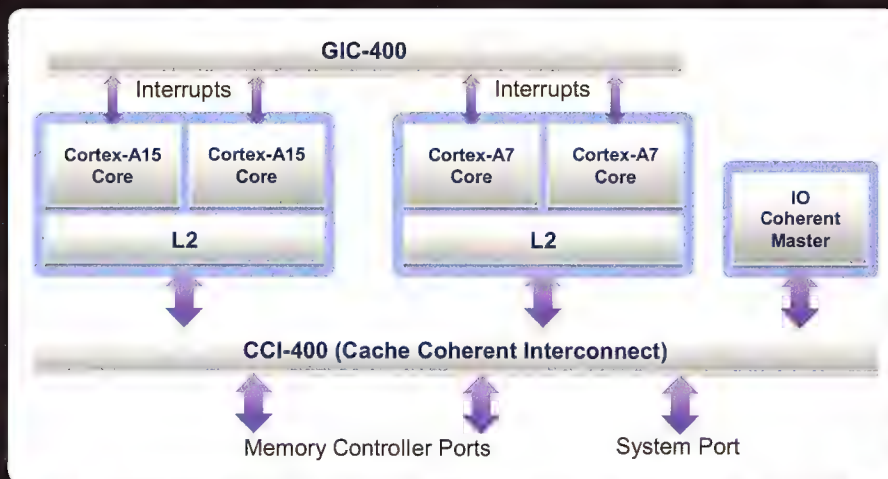
It might seem that the Cortex-A7 is just a cut-down Cortex-A15 (or that the latter is a beefed up version of the former) but in fact the two designs operate in different ways.

This is a different approach to the one we see from most silicon engineers. ARM isn't too concerned about using extra silicon.

The Cortex-A15 is an out-of-order, triple-issue processor design with a pipeline length of 15-24 stages; the Cortex-A7 is an in-order, non-symmetric dual-issue design of 8-10 pipeline stages.

ARM says that although sharing a single Level 2 cache between the CPUs would have been 'more area optimised' or, in other words, would use fewer transistors and less silicon, 'this part of the design can benefit from optimisations in favour of energy efficiency or performance'. Therefore the two CPUs have separate integrated Level 2 caches to allow the Cortex-A15 to focus on performance and the Cortex-A7 to reduce its power consumption. From this we extrapolate that the Cortex-A7 has a smaller Level 2 cache than the Cortex-A15.

This is a different approach to the one we see from most silicon engineers. ARM isn't too concerned about using extra silicon if it results in a lower power draw. Typically, Intel, AMD and



The big.LITTLE design relies on two esoteric units to analyse and assign work to the most appropriate CPU, and then gather up the output of whichever CPU was in use.

NVIDIA engineers and designers are trying to crank out as much performance per square millimetre of silicon area because they're butting up against the limits of silicon lithography and how big a processor die can be. ARM chips are comparatively tiny.

The consistency of the two CPUs is only part of the big.LITTLE design. We spoke to Ian Drew, executive vice president of strategy for ARM, who told us that designing the big.LITTLE had taken four years, and that ARM doesn't expect to see any devices using the design for a few years. The Cortex-A15 was launched in September 2010 but actual devices are only slated for a 2012 release.

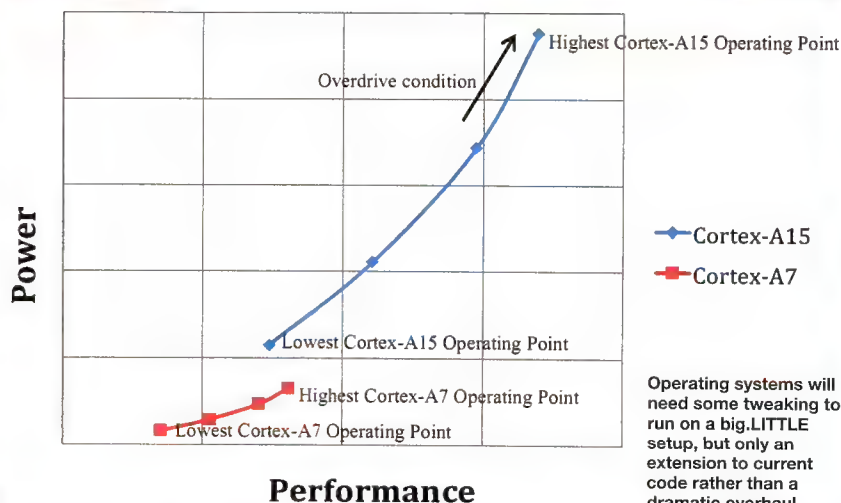
Making the Switch

Much of the work on big.LITTLE has gone into developing the interrupt controller, which assesses the work and assigns it to whichever

2000

Motorola licenses ARM
technology; TSMC and UMC
join ARM Foundry Program.

Intel introduces awful
NetBurst architecture,
promises 10GHz CPUs.



Operating systems will need some tweaking to run on a big.LITTLE setup, but only an extension to current code rather than a dramatic overhaul.

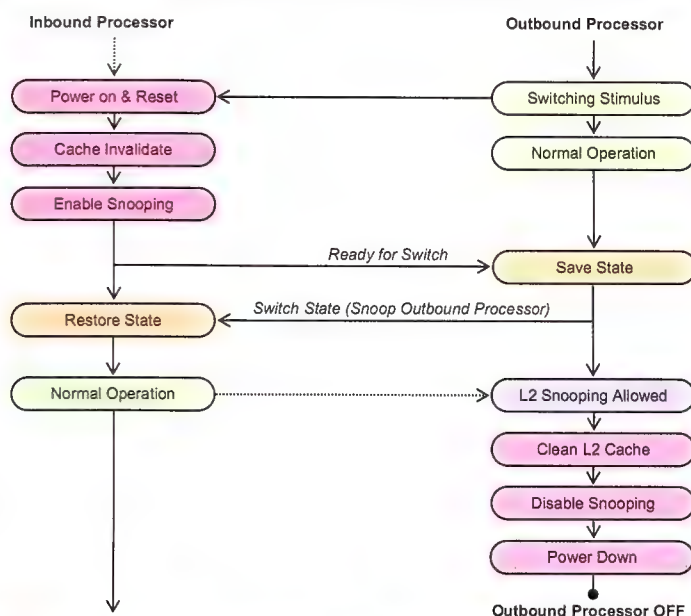
CPU is best suited to execute it, and the interconnect unit that gathers the output from either CPU. The former is the GIC-400, a shared generic interrupt controller that can distribute up to 480 interrupts to the Cortex-A15 or Cortex-A7, activating the number of cores needed to complete the workload. The CCI-400 (a cache-coherent interconnect) is the buffer between the CPUs and the rest of the system. It accepts work from whichever CPU was working and outputting data, as well as connecting the big.LITTLE processor to system memory and any other system busses present.

The GIC-400 is the more complex of the two units, although it's based on existing Dynamic Voltage and Frequency technology. This specifies certain operating points where a CPU should speed up to cope with application demands.

In a big.LITTLE setup, these operating points merely span the profiles of both CPUs, with a slight crossover point from the power-frugal Cortex-A7 to the faster Cortex-A15 to allow for a seamless switchover rather than system crashes.

The most important operating point is where

A CONCEPTUAL OVERVIEW OF HOW A CPU SWITCH HAPPENS



saves its integer, its Advanced SIMD register files and its entire CP15 configuration state. This data must then be retrieved by the inbound processor.

Any active interrupts that are controlled by the GIC-400 must be switched. However, the outbound processor's Level 2 cache can be left active (as both caches are coherent), which helps 'improve the cache warming time of the inbound processor through snooping of data values'. Taking data from a local cache is much

quicker than flushing data to main memory and then fetching it straight back.

Is redundancy the future?

The big.LITTLE design shows how different ARM is to other processor designers. Intel, AMD and NVIDIA would probably be horrified at the prospect of designing a processor with such redundancy as switching between two entirely different designs. ARM's focus on power saving rather than silicon saving makes the big.LITTLE's redundant processor design entirely sensible. Fast CPUs can't deliver low power draw because of their long pipelines that comprise many transistors.

So should Intel and AMD be worried about ARM's plans? ARM strategist Ian Drew clearly thinks so. "They should already be worried by us, because their 'little' is bigger than our 'big'... So yes, if they weren't worried about that, [big.LITTLE] gives them a big problem." While Intel is struggling

to deliver enough performance and power efficiency through process shrinks and the Atom architecture, ARM is pushing up the performance levels of its CPU designs while keeping power draw in check.

With Windows 8 due to run on ARM, the release of Cortex-A15 devices next year, and big.LITTLE devices in the years after, Intel and AMD have strong competition in the growth markets of smartphones, superphones and tablets. It's not inconceivable that in a couple of years the desktop and laptop processor war won't be between Intel and AMD, but Intel and ARM. That's a huge achievement considering ARM's humble beginnings.

2008

Ten-billionth ARM processor shipped; Mali-200 meets Open GL ES 2.0 at 1080p.

First Android smartphone launched, the HTC Dream.

the Cortex-A7 has reached the limits of its performance but an application requires more power. In this case, the GIC-400 must make a few decisions. First it must decide if it's worth switching the Cortex-A15 or whether it's just experiencing a short-term spike in demand. The time and power spent switching from the Cortex-A7 to the Cortex-A15 and back might actually cause a drop in performance – as the switch takes 20,000 cycles, so to switch and switch back would require 40,000 – and therefore unnecessary power draw. However, if the workload is strenuous and prolonged, it's worth firing up the Cortex-A15.

Switching between the outbound processor and the inbound is said to involve fewer than 20,000 processor cycles. According to ARM, the process is made smoother by the fact that 'there is one-to-one mapping between state registers in the inbound and outbound processors'. To make the switch, the outbound processor

2010

Cortex-M4, Cortex-A15, Mali-T604 launched; Microsoft licenses ARM technology.

iPad and iPhone 4 launch, both using a Cortex-A8 Apple A4 CPU.

ASUS Rampage IV Gene

Is the Gene genetically superior?

Street Price \$360 Supplier ASUS
Website <http://tinyurl.com/ASUS-RampIV>

Specifications Socket 2011; X79 chipset; mATX form factor; 3 x PCI-e 3.0 x16 (2 x 16x, 1 x 8x electrically); 1 x PCI-e 2.0 4x; 3 x SATA2, 4 x SATA3; DDR3-2400

Computing has taken an interesting turn in the last few years. At one stage the common desktop PC had infiltrated many a home, providing a means of content production and consumption through traditional mouse and keyboard input. Today the focus is on smaller devices with a focus on purely consumption e.g. netbooks, iPhone/iPads and various Android devices. These devices are portable, consume minimal power, and offer a great deal of interactivity. The lack of raw processing power is offset by the uptake of cloud computing services such as Amazon's Silk browser and OnLive's streaming gaming service.

Fortunately this year is shaping up to be the start of a leap toward smaller energy efficient desktop computing. We've seen the amazing performance and energy consumption stats of the new 28nm 7xxx series GPUs from AMD, and the upcoming 22nm Intel Ivy Bridge processing parts can only further improve the gains made by Sandy Bridge. What's more is that with every passing generation the demands of software on new hardware have reduced significantly. It's not unheard of to play the latest gaming titles on midrange cards – a few years ago you'd have to make large quality compromises to achieve that.

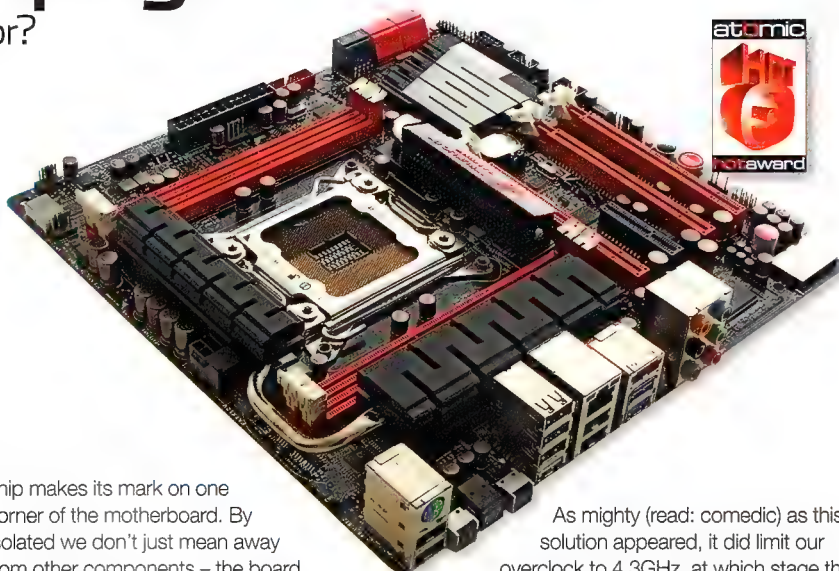
With low power comes reduced heat output, which in turn means more power in a smaller package. This is where the Rampage IV Gene comes in. This micro-ATX board packs many of the features of the larger LGA2011 based systems into a small package with minimal compromises. It's powered by the X79 chipset, and supports quad GPU SLI/Crossfire, although one should note that physical constraints (it has physically less slots) mean that quad GPU setups will require two dual-GPU cards.

An isolated and shielded SupremeFX III audio

chip makes its mark on one corner of the motherboard. By isolated we don't just mean away from other components – the board has been etched around the chip leaving a transparent trace. For added effect, this trace is back illuminated by red LEDs. The result is an audio solution with 110dB SNR and a Tron-esque board design which saves the owner using up a PCI-e slot with an external solution.

Other notable features of this board include GameFirst which manages network traffic to allow simultaneous Internet activities without affecting online game latency, CPU Level Up functionality to automate the process of overclocking for those who aren't so technically minded, and ROG Connect – a feature we've covered previously, that basically lets you overclock and monitor the motherboard via a laptop or another PC. The board also has power and reset switches in addition to a debug display.

Performance wise the Rampage IV Gene fared well. We tested with an i7 3820 whilst the i7 3960X was being serviced by Matt's beastly HD7970 Crossfire rig (on pg43). This also meant that our only LGA2011 compatible cooler was unavailable, thus we had to settle with a cooling solution akin to the creations of Dr Frankenstein (i.e. a TRUE held down by a Jenga tower of HDDs and PSUs surrounded by Noctua fans).



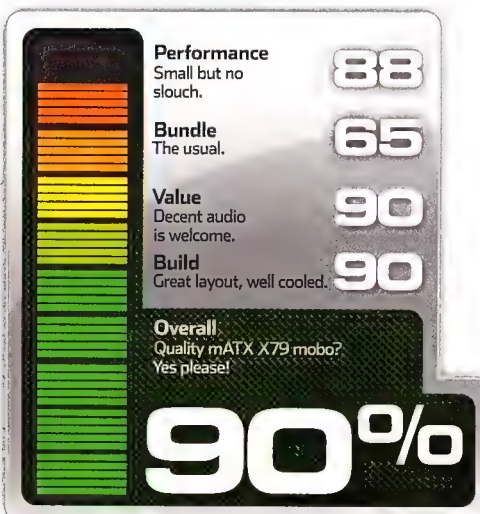
As mighty (read: comedic) as this solution appeared, it did limit our overclock to 4.3GHz, at which stage the CPU was hitting just under 100c load under Prime95. We used 1.30v vCore throughout testing with medium LLC.

Bundled with the Gene is the usual kit plus an SLI bridge, case sticker and a ROG Connect cable. The I/O panel provides a PS/2 combo port, 3Gb/s eSATA, a single LAN port, 2 x USB 3.0, 8 x USB 2.0, optical S/PDIF out, six audio jacks, clear CMOS and a ROG Connect switch.

ASUS's Rampage IV Gene proves that there's no longer a pressing reason to purchase massive E-ATX boards unless you've got some serious GPU-dependent number crunching to attend to. Granted, smaller enthusiast systems do come at a premium, and you won't be able to attach oversized air coolers like the Noctua NH-D14. At \$360 this isn't exactly a budget solution, but it competes well within the socket 2011 spectrum of motherboards. The \$60 premium over a standard ASUS LGA2011 board is well worth it for the better onboard audio, enthusiast features and compact design. VC

ASUS Rampage IV Gene

i7 3820 (HT on)	100x36; DDR3-2133 9-11-9-27-2T	100x40; DDR3- 2133-9-11-9-27-2T	100x43; DDR3-2133 9-11-9-27-2T
PiFast	20.39s	18.42s	17.18s
wPrime 32M - single thread	38.751s	34.944s	31.51s
wPrime 32M - multi-thread	9.828s (3.94x efficiency)	8.846s (3.95x)	7.97s (3.95x)
CineBench R10 64bit - single thread	6050	6700	7141
CineBench R10 64bit - multi-thread	21943 (3.63x efficiency)	23876 (3.56x)	25611 (3.59x)
Everest Read	19045MB/s	20242MB/s	21034MB/s
Everest Write	14525MB/s	16090MB/s	17296MB/s
Everest Latency	46.3ns	44.8ns	44.1ns

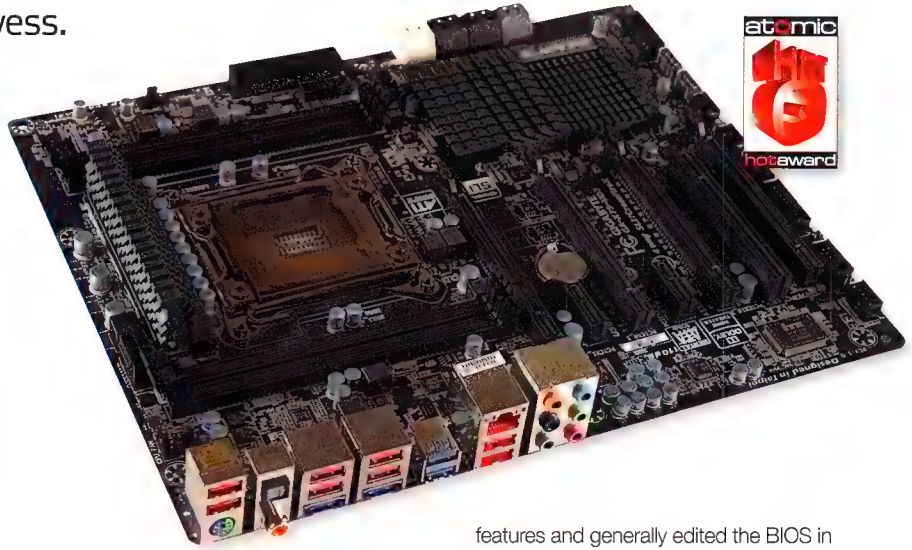


GIGABYTE GA-X79-UD3

Sensible specs and OC prowess.

Street Price \$285 Supplier GIGABYTE
Website <http://tinyurl.com/GB-X79-UD3>

Specifications Socket 2011; X79 chipset; ATX form factor; 4 x PCI-e x16 (2 x 16x, 2 x 8x); 2 x PCI-e 1x, 1 x PCI; 4 x SATA2, 4 x SATA3, 2 x GSATA3; DDR3-2133



Given the relatively sensible price tag of the GIGABYTE X79-UD3, one may assume that the board is lacking in features when compared to many of the more expensive boards found on the market. It is a reasonable assumption, but it is also not completely correct.

Gigabyte have on offer here one of the best value boards you'll find, using the X79 chipset and 2011 socket. Not only does it have support for 4-way CrossFire or SLI, it also has the build quality and overclocking prowess that earned Gigabyte the respect it currently commands in the marketplace.

Ferrite Chokes and the usual Solid Capacitors add to the longevity and overall stability of the motherboard, while the advanced 9-phase PWM also ensures a steady and consistent voltage for your overclocking endeavours on Intel's newest and most powerful platform.

While we are impressed with the board, there are a few features missing on the UD3 that are found on the higher-priced UD5 and UD7. There are only four RAM slots instead of the eight slots found on the UD5 and 7, which may not matter to most people, as you can still equip the UD3 with up to 32GB of high-density RAM if you feel the need – but it's less.

A feature that some overclockers may miss, however, is the removal of the on-board controls. Things like a power button and reset button do really come in handy when you are trying to play around with your PC and diagnose issues, along with the LED POST debug screen. More times than not those little error messages can help you quickly determine a problem without having to run through the usual check-list of issues, when familiar with codes. Again, not everyone will miss this, and it is a great way to keep costs down and important features included.

The overclockers among us will be happy to know that the new BIOS contains a vast array of options that cater to your every need. Memory, chipset and CPU clocks and features are all fully customisable, along with the expected advanced voltage control for everything. The BIOS truly is detailed, and we do appreciate the effort GIGABYTE has put into its new layout, as it should help newcomers to the scene.

Veteran overclockers may become quickly frustrated with the way the menus have been set up, however, and at the relatively slow speed at which you can scroll through the BIOS with your keyboard, compared the old 'analogue' BIOS. There are definitely positives and negatives to both the new and old BIOS, but personally I feel this whole GUI BIOS thing is getting a little too complicated – taking part of the charm out of the 'hacking' feel many user got fiddling about with their BIOS.

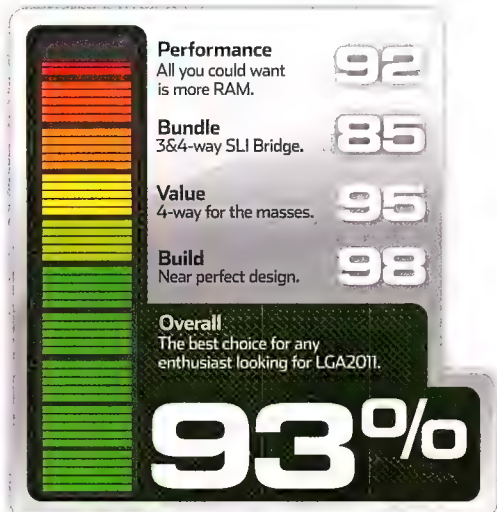
Whacking our i7 3960X into the system we quickly confirmed setting up for an overclock is at least easier than it used to be; we simply selected the pre-defined 'overclocking' profile within the BIOS. This made changes to a few voltages, removed the usual power saving

features and generally edited the BIOS in such a way to bring stability to your average air overclock. If you're chasing bigger numbers, 'extreme' can be selected, disabling all CPU features (except HT) and applying larger BCLK and CPU multiplier automatically. These profiles take some of the fun out of learning what all of the new options do for yourself, but it does make it easier for anyone who just wants to reach a half-decent overclock with minimal risk and time spent.

Unfortunately we weren't able to take the board any higher than 4.7GHz, as our 3960X sample doesn't seem able to find true stability at anything above 4.6GHz, even if we apply 1.55v+ (the same happened on last month's Rampage IV review). Don't let that news disappoint though, as we are sourcing a new CPU, and we know this board is capable of great things. Only last month Hicookie (GIGABYTE's resident overclocker) took a plethora of world records using the X79-UD3. If the board is good enough to take LN2 world records, it is most certainly good enough for your average air-cooled enthusiast PC. **MW**

Gigabyte GA-X79-UD3

	Intel i7 3960X (HT on)	33x100; DDR3-2133 @ 11-11-11-281T	36x100; DDR3-1600 @ 9-10-9-241T	40x100; DDR3-1333 @ 11-11-11-281T
PiFast		22.22s	19.06s	18.33s
wPrime 32M - single thread		42.416s	36.051s	35.006s
wPrime 32M - multi-thread		5.928s	4.976s	4.852s
CineBench R10 64bit - single thread		5396	6321	6536
CineBench R10 64bit - multi-thread		29535	33524	35477
AIDA Read		17546	17562	19477
AIDA Write		12742	15056	15443
AIDA Latency		50.5ns	53.7ns	46.9ns



XFX RADEON HD 7970 BLACK EDITION DOUBLE DISSIPATION

The RADEON 7970 is finally hitting stores, and XFX has delivered one hell of a high end card.

Street Price \$799 Supplier XFX

Website <http://tinyurl.com/7970-DD>

Specifications RADEON HD 7970 @ 1GHz; 3GB GDDR5; PCI-Express Gen 2 and Gen 3 support; 1x DVI-DL; 1x HDMI; 2 x mini-DisplayPort; Dual Slot card.

Just before Christmas AMD hit us with one of the timeless moves in video card marketing, the paper launch. It unveiled the RADEON 7970 and its revamped 'Graphics Card Next' architecture without a retail graphics card in sight, much to the annoyance of enthusiasts. This month was the real launch of the card, and curiously the first products we are seeing in the labs are custom designs, rather than the usual 'reference card with a sticker' offerings.

Our first real RADEON HD 7970 comes from XFX, a company that has been curiously quiet over the past year (it didn't even show off cards at Computex 2011). The wait was worth it though; not only does the RADEON HD 7970 Black Edition Double Dissipation card come pre-overclocked, but it has the prettiest design that we have seen in some time. Even the component-ignorant members of the editorial room commented on the 'Double Dissipation' heatsink, whose shiny highlights and metallic stylings make it look more like a set of old school decks rather than a new generation video card.

But looks mean very little without performance, something that this card packs in spades. This is thanks to the new 28nm AMD GPU, which has been cranked up to 1GHz from its base clock of 925MHz. Alongside this is the standard 3GB of GDDR5 memory.

This translates to some truly astonishing single GPU performance numbers. We tested the card on an ASUS Rampage IV Extreme motherboard, Intel Core i7-3960X CPU with 8GB of G.Skill DDR3 in order to minimise bottlenecks, and

the results were incredibly impressive. We saw 3DMark11 scores of P8093 and X2571 – in the same system with an ASUS GeForce GTX 580 Direct CU II the scores were P7094 and X2212.

Moving on to the now-aging but still taxing Crysis tests, the XFX 7970 delivered 72.05fps in our Very High detail benchmark, again beating out the GTX 580 which scored 68.99. NVIDIA historically has an advantage in tessellation benchmarks because of its heavy focus on tessellation units in its Fermi architecture. We were pleasantly surprised to see the 7970 competing with the GTX 580 – in the normal test the 7970 scored 36.3 fps versus the GTX 580's 35.4fps and in the extreme detail run the 7970 delivered 29.6fps to the GTX 580's even 29 fps.

Given the 7970's performance advantages in our other benchmarks the GTX 580 can still be considered a better tessellator on a clock for clock basis, however it shows that AMD's new

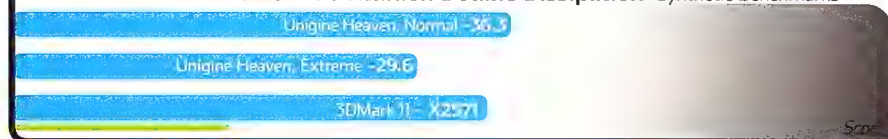
architecture is more than comfortable with heavier tessellation loads.

This really is an astonishing piece of graphics hardware, and the fastest single card solution on the market. It smacks the still excellent GeForce GTX 580 around in the benchmarks, but you won't notice any performance difference in the real world.

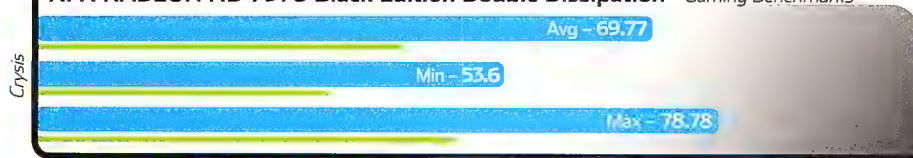
We can happily say that the RADEON HD 7970 is the fastest GPU on the planet, and this XFX Black Edition Double Dissipation version is the fastest 7970 we have seen (not to mention VERY pretty). With a pricetag of \$799 the XFX card is also over \$200 more expensive than a GeForce GTX 580, which delivers just as good single screen performance. One thing is for sure, the middle to lower end of the RADEON 7000 range is going to be freaking amazing. **JG**



XFX RADEON HD 7970 Black Edition Double Dissipation Synthetic Benchmarks

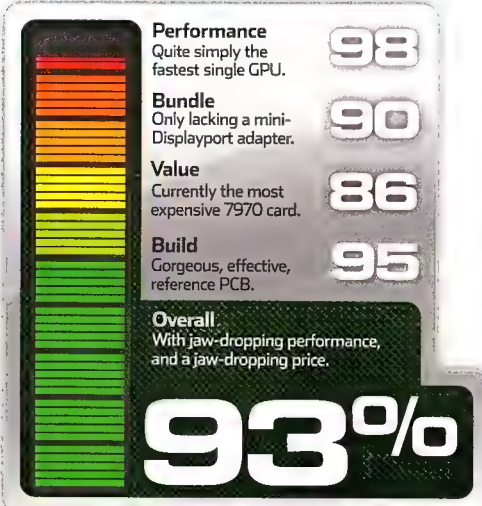


XFX RADEON HD 7970 Black Edition Double Dissipation Gaming Benchmarks



- Reference scores: XFX 5850

Frames per second



AMD Radeon HD7970: Under the Scope

Matt Wilson takes a vacation to the Southern Islands for an intimate look at the newest AMD architecture and what it means for hardcore users.

Street Price \$800 **Supplier** AMD

Website <http://tinyurl.com/AMD-7970>

Specifications 925MHz core; 1375MHz memory (5500MHz effective); 'Tahiti' core; 2048 unified shaders; 3GB GDDR5; 384-bit bus width; dual slot active cooling; 8-pin, 6-pin PCIe power connectors

It has been more than a few years since we have seen any real architectural reworking or re-invention from either AMD or NVIDIA. AMD last had major changes in 2006, coinciding with the launch of DX10. Come 2012 we now see a complete overhaul and the largest change in architecture from AMD in six years.

The HD7970 finds itself sitting in a fairly unique position, not only because the HD7970 is now the fastest single GPU available to the mainstream market, but because it is currently the only 28nm GPU available, the only DX11.1 GPU available and the first of the 'Southern Islands' cards to hit the market.

In theory we should have been moving from 32nm to 28nm, giving us a relatively small gain in transistor count and therefore theoretical throughput of the GPU; but given we are moving from 40nm to 28nm, we are instead seeing performance gains similar to what we saw when AMD moved from the 4870 to the 5870.

Architectural Changes

As for the nitty-gritty of what is different when we compare the 7970 to the 6970, there have been some changes in not only the core layout and structure of the GPU die, but also in the way information is addressed and processed.

AMD have labelled their new architecture AMD "Graphics Core Next" (GNC). GNC is designed to increase overall compute power of the GPU significantly, and if our tests are anything to go off, AMD have managed to not only meet our initial expectations – they have greatly exceeded them. In some areas (such as tessellation) AMD have managed to produce an increase from 200 to 400% in compute power! And while we realise this really only brings the HD7970 up to par with the GTX 580 most of the time, compared to the old architecture of the HD 5870 and 6970 we can see that "Tahiti" really is something special.

The HD6970 used the VLIW4 Architecture, and while it was very good at graphics work, it was hard to talk up its compute power while keeping a straight face. So as long as you only want to handle high parallel workloads (video games are for the most part parallel computing) VLIW is fine, but if you want to create an architecture which can do both graphics and compute work, you need to undertake a complete overhaul.

With AMD Graphics Core Next, VLIW is going

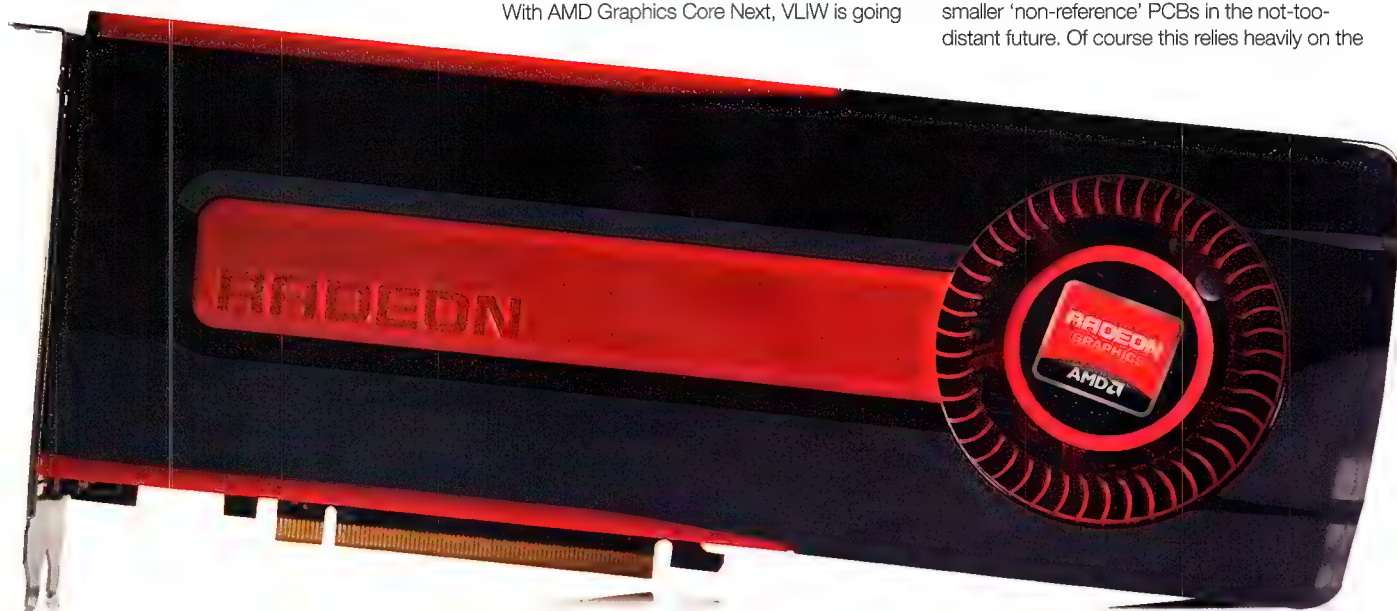
away in favour of a non-VLIW SIMD design. In principal the two are similar – run lots of things in parallel – but there's a world of difference in execution. Whereas VLIW is all about extracting Instruction-Level Parallelism (ILP), a non-VLIW SIMD is primarily about Thread-Level Parallelism (TLP).

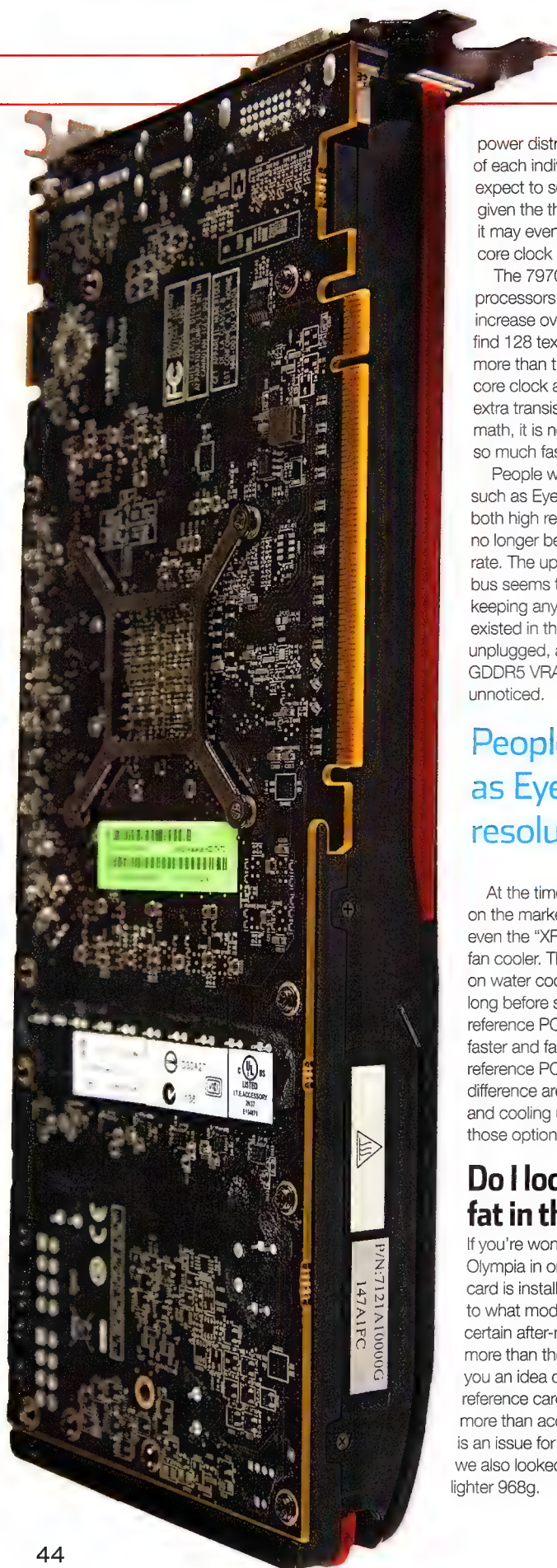
Not to be confused with the SIMD on Cayman (which is a collection of SPs), the SIMD on GCN is a true 16-wide vector SIMD. A single instruction and up to 16 data elements are fed to a vector SIMD to be processed over a single clock cycle. As with Cayman, wavefronts are 64 instructions long, meaning it takes 4 cycles to actually complete a single instruction for an entire wavefront. This vector unit is combined with a 64KB register file, and that composes a single SIMD in GCN.

Again, this is pretty much just playing catch up to the GTX 580 and Fermi architecture as a whole, but the fact that AMD managed to make such solid improvements on their new architecture is promising for future revisions and architectures.

The HD7970

As mentioned earlier, the HD7970 GPU is built using a TSMC 28nm process. The GPU die itself measures a measly 365mm² and therefore should be relatively simple to squeeze onto smaller 'non-reference' PCBs in the not-too-distant future. Of course this relies heavily on the





power distribution and other capabilities of each individual card. You can also expect to see a 7990 at some point, and given the thermal properties of this GPU, it may even boast the same 925MHz core clock as the 7970.

The 7970 contains 2048 stream processors, which is roughly a 25% increase over the HD6970. You will also find 128 texture units, approximately 30% more than the HD6970, a 45MHz higher core clock and a whopping 1.67 Billion extra transistors. When you do the simple math, it is not hard to see why this card is so much faster than the HD6970.

People with large monitor resolutions such as Eyefinity should be cheering, as both high resolutions and high AA should no longer be so taxing on your frame rate. The upgraded 384-bit memory bus seems to be more than capable of keeping any bottlenecks that arguably existed in the HD6970 completely unplugged, and the 3GB of dedicated GDDR5 VRAM certainly doesn't go unnoticed.

People with large monitor resolutions such as Eyefinity should be cheering, as high resolutions and high AA should work better.

At the time of writing, all cards available on the market are reference PCB design, even the "XFX Black" model with the dual-fan cooler. This means anyone planning on water cooling shouldn't leave it too long before snapping these up, as non-reference PCBs find their way to market faster and faster these days. Being reference PCB means the only possible difference are display outputs, warranty and cooling used, so be sure to buy on those options alone, not brand name.

Do I look fat in this cooler?

If you're wondering if you'll need to be Mr. Olympia in order to lift your PC once the card is installed, it will greatly come down to what model you end up with. Obviously certain after-market coolers weigh a lot more than the stock card, but to give you an idea of what to expect, the AMD reference card weighs 1.036KG. This is more than acceptable, though if weight is an issue for you the XFX Black Edition we also looked at comes in at a noticeably lighter 968g.

PCI-Express 3

PCI-E Gen3 is making its first real world appearance, and while many people are excited for it, there are also more than a few who have decided that it's not really worth buying a GPU or motherboard that supports it just yet. We undertook a few benchmarks to find the performance difference between the HD6970 in both a 2nd and 3rd generation PCI-E slot. From what we have gathered thus far, it doesn't seem to be a technology you need just now (supporting our earlier thoughts at www.atomicmpc.com.au/?275040). We'd instead suggest sticking with PCI-E 2.0 and holding off for Ivy Bridge at the very least, if not Haswel. That way the technology is fully realised, and the gear you end up with will last you the full 3-4 year cycle.

Eyefinity Changes

AMD have updated and improved Bezel Compensation, reducing the "blind spots" that could cause issues previously. Of course the bezels are still in place as they are physical objects and not easily removed without damaging your monitor, the technology simply makes sure that all of the pixels are being

displayed correctly, and you aren't missing important information from the GUI or HUD.

Another improvement is the ability to set custom resolutions. This has limited functionality for most people, however it does allow for more advanced Eyefinity setups and greater customisation. It will be particularly useful for people mixing and matching different monitor models, or with people using greater than three monitors. For example, AMD added a 5x1 landscape mode, offering a panorama view.

In theory you can get up to six displays off a single 7970 GPU, though most vendors are releasing support for four monitors off a single card as standard. Some will no doubt release models with six mini-DP ports on the back, so if you're planning on setting up a stock trading wall in your house for day-time use, but still want a graphical powerhouse for the night-time gaming, be sure to keep your eyes peeled over the coming months.

Single Monitor Performance

If you plan on buying a 24in monitor for \$150 at MSY running a 1920x1080 resolution, we would tell you to save your money and wait for the 7870 to hit the market – it will be far better suited



to that resolution, with a smaller memory bus and capacity making the card cheaper to make, and to buy.

As you can see from the game results, this card can chew up and spit out any game you throw its way at 1920x1080, and to be honest is wasted money. A 1GB HD6950 is still our card of choice for the enthusiast with a standard 1920 x 1080 screen.

If however you are planning an Eyefinity build, the extra GPU grunt paired up with a larger memory bus and capacity should get you gaming at extremely large resolutions without the minimum FPS drop we used to see on the HD5870 and HD6970. We're confident we will see the number of people adopting Eyefinity sky rocket in the coming months, as both panels are

dropping in price, and the GPU grunt is finally there to legitimately play demanding games off a single or dual-card setup. So let's do that.

CrossFire Scaling

We were lucky enough to receive three cards this month, meaning we were able to test two-way CrossFire along with the uber-awesomeness that is three-way. As you can see from the performance graphs, you can expect anywhere from 70-100% performance gains in most games and GPU intensive scenarios. Not bad considering those kinds of gains are typically reserved for mid-range GPUs.

Adding a third card performs a little worse as you'd expect, but this can often be due to other issues like CPU bottleneck, game/software design, driver maturity, GPU load balancing and even throttling if there is insufficient cooling. Overall we were pleased with the performance

gained while using three cards, however we would really only suggest this kind of setup if you plan on pairing up three super HD monitors achieving resolutions around 7680 x 1600.

If you have \$750 to spend on your next PC graphics upgrade a 7970 is a good option no doubt, but in this day and age that price seems insane. We know that it was only a few years ago that NVIDIA launched the GTX 280 at over \$1000, and it was only a few years before that AMD were selling the X1950XTX Master Card for around \$1600, but it still seems like a lot of money to drop when you can pick yourself up a 6870 CrossFire setup for around \$400 and play nearly every single game on the market maxed out.

Our advice for people considering this card would definitely be to upgrade your monitor first. There simply is no reason to run a card with this much VRAM and bus speed on a monitor smaller than 2560x1440.



Overclocking Performance

The card comes at a standard clock of 925MHz, though no doubt we will start to see a lot more cards like the XFX Black Edition sporting a beefier 1GHz stock clock. For now though, overclocking is the best way to unlock extra performance from your card. We managed a fairly respectable (and the driver's maximum allowed) core clock of 1125MHz @ 1.216v.

unlocked MSI Afterburner (see boxout right), ramped up the voltage slider to 1.236v, and decided to see just how high this card could clock on the stock VRM and heatsink. Initially we hit a wall at a whopping 1300MHz, but it didn't take long for us to man up and set the voltage to card-exploding levels of 1.299v. This allowed us to reach the unimaginable core clock of 1325MHz! For a reference design card, this

There is no doubt the HD7970 has got a bright overclocking future ahead of it, so keep an eye out in the future for heavier overlocks.

Overclocking without voltage control won't get much over 1040MHz @ 1.174v (stock). We were able to pump the RAM from 1375MHz all the way up to 1790MHz without losing any stability – without control over the RAM voltage. We're sure that cards like the MSI Lightning will offer control, and even higher clocks will be possible.

Deciding we we're ready to play with fire, we

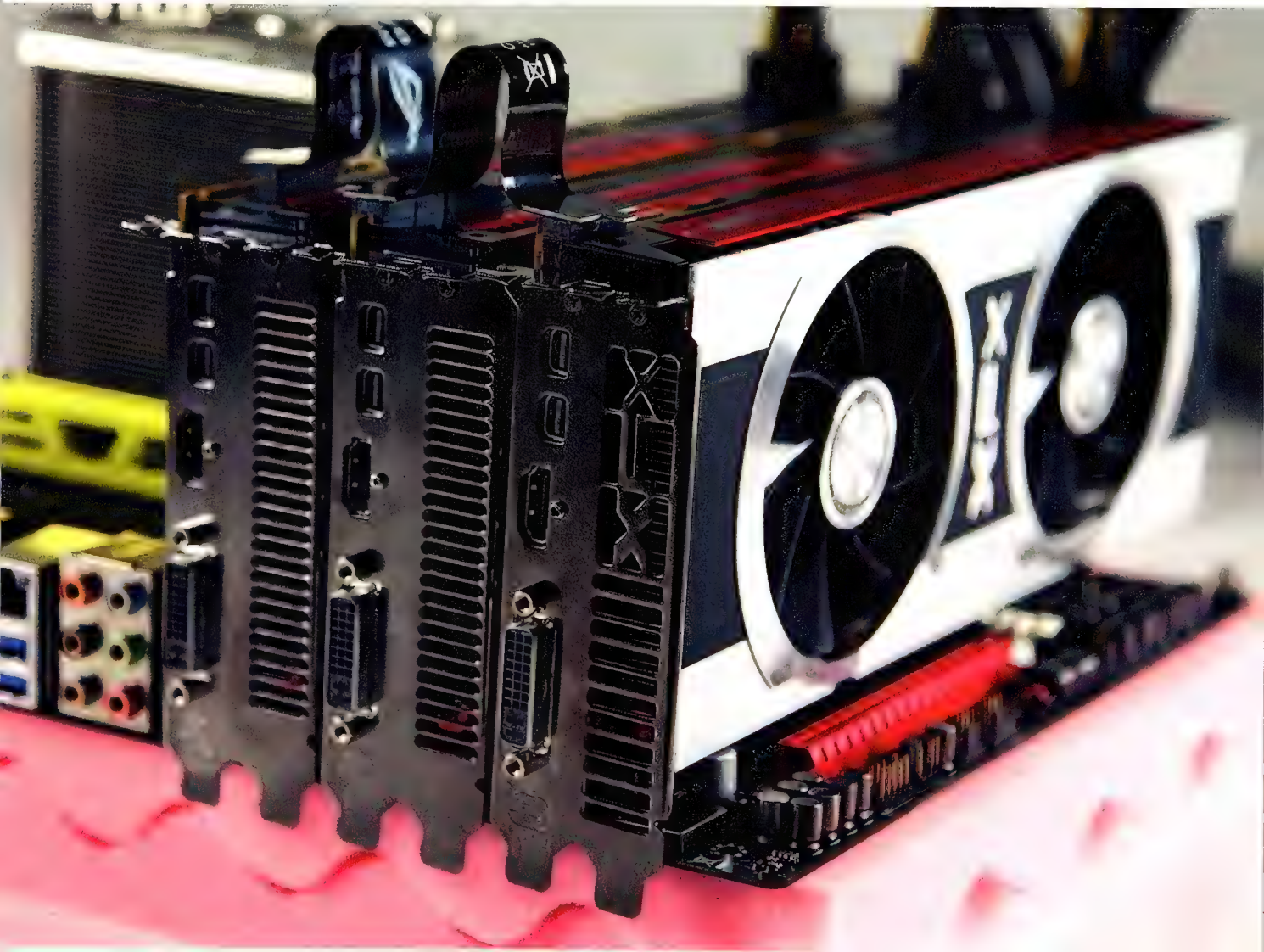
is insane, not to mention a top-tier GPU like the 7970. We expected a maximum overclock of around 150MHz or so – not 400MHz! We can't wait to see what the big partners do with this card. Give it a more advanced PWM and you'll be laughing all the way to 1400MHz and above.

We could have arguably taken the card further, but temperatures were approaching the 95C

Screw limitations

For those of you who want to take the card further than 1125MHz core frequency, you will need to enable 'Unofficial Overclocking Support' within MSI Afterburner. If you want to do this, all you need to do is open up the MSI Afterburner .cfg file in Notepad, find 'UnofficialOverclockingEULA' and in the field write 'I confirm that I am aware of unofficial overclocking limitations and fully understand that MSI will not provide me any support on it'. Next, simply change the value of 'unofficialOverclockingMode' (next command line down) from blank to 1.

mark and stability was shaky at anything over 1340MHz. The maximum clock we achieved on the day was 1350MHz, but it only passed one time through the Heaven Benchmark, and it was artifacting a little. For this reason we set the card back to the benchmark stable clock of 1325MHz. There is no doubt the HD7970 has got a bright overclocking future ahead of it, so keep an eye out in the future for heavier overlocks on new cards like the SOC or Lightning, and who knows, we may even chuck a couple on LN2!





If you do plan on overclocking your HD7970 to such extremes, neither the manufacturer nor Atomic offer any warranty or support for graphics cards modified this way. It is an extreme overclocker option only; the high voltages and clock speeds unlocked this way can and will destroy your card, so use at your own peril.

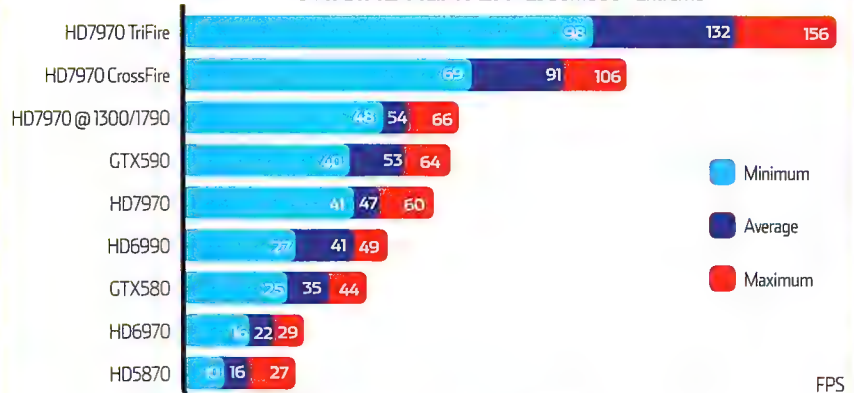
Running the standard fan profile and completing three "extreme" settings on Heaven Benchmark is enough to get any video card sweating – the HD7970 managed to peak at around 82C. Spinning the fan up to around 4,000RPM (~70%) will cool the card down to ~64C quickly, though we won't lie, it is unbearably loud. We found anything over 2,000RPM (30%) to be clearly audible, and anything over 3,000RPM irritating – so a well-ventilated case is a must to keep noise down.

Zero Hero

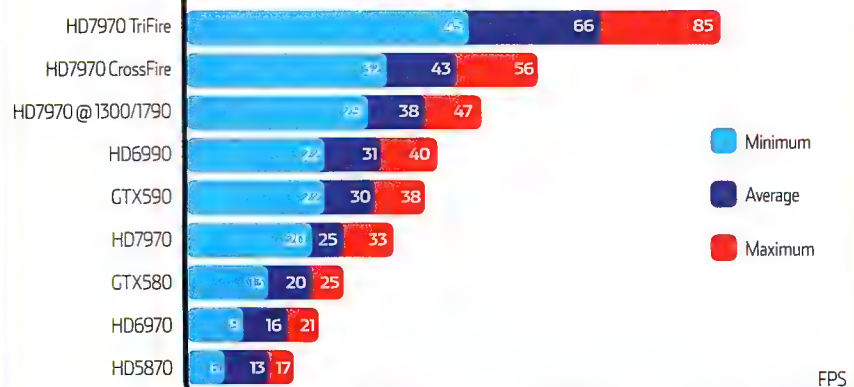
As well as a new cooler, AMD have also launched a new power saving featured called ZeroCore with the HD7970. Essentially it drops the GPU power consumption to ~3W when in long idle state (screen turns off from inactivity). Each additional card you add to the mix adds no extra long idle power draw, and should consume as close to 0W as possible. This means your high end gaming machine now makes a half-decent Torrent box.

AMD haven't had the top single GPU card on the market since the launch of the HD5870, and that was superseded by the GTX 480 roughly 5 months later, so it is good to see team red back and giving NVIDIA some competition. At the end of the day good competition is what makes the world go round, and AMD certainly have done their part to ensure the high-end market is hard fought. We wouldn't be too surprised to see these cards hold their value for the next few months as stock is always short after launch and Australian retailers try to make a buck. Running two or even three 7970 cards in CrossFire is most definitely overkill for the average gamer, but will be great for high-res users. For anyone wanting to save a bit of cash however, the HD6950 will likely fall in line in terms of performance, though hopefully with a smaller price tag. (P)

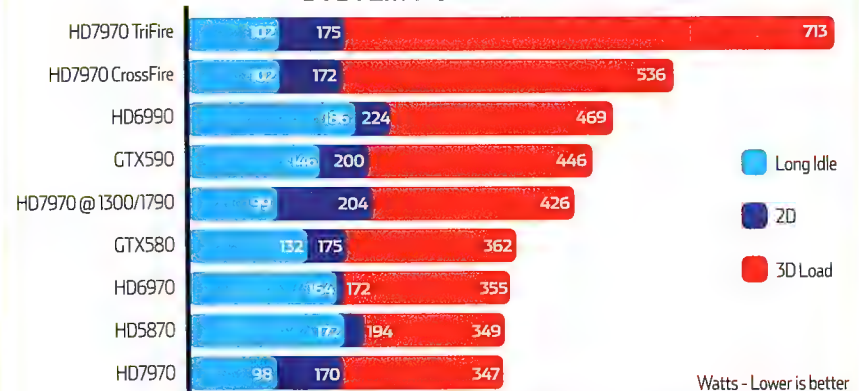
UNIGINE HEAVEN 2560x1600 "Extreme"



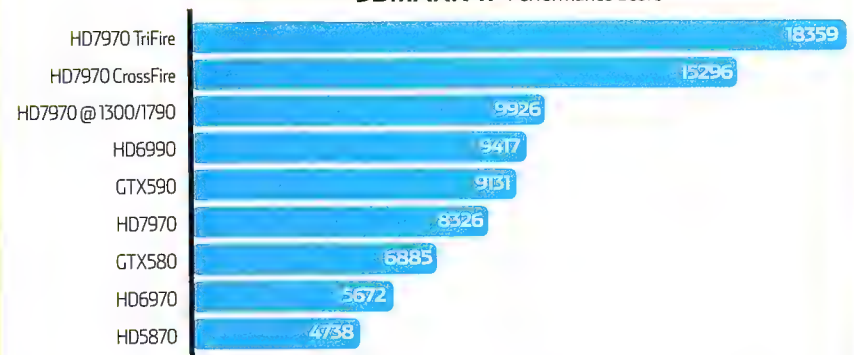
METRO 2033 2560x1600 "Ultra"



SYSTEM POWER CONSUMPTION



3DMARK 11 Performance Score



All Games Benchmarked with FRAPS

XFX Pro Series 1250W Black Edition

Power to the masses!

Street Price \$409 Supplier XFX

Website <http://tinyurl.com/1250-BE-PSU>

Specifications ATX form factor; 20 + 4 pin, 2 x 8-pin CPU, 8 x 6+2 pin PCIe, 11 x SATA, 1 x floppy, 8 x molex

The quality of the power supply is often overlooked in computer builds because they have no direct impact on performance. It's tempting to save a bit of money to spend on other parts instead. This often comes back to bite users in the arse when a random power spike takes out half their system, or when the whirring of loud fans desperately trying to cool down the inefficient internals slowly turns them mad. Often the fault lies with the school of thought that all X watt power supplies are created equal, which is far from the case.


It's a good thing that XFX's Pro Series 1250W BE is a high quality device. The 80Plus Gold certified PSU (up to 90% efficient) has a full modular design and a single PWM-controlled 135mm fan. This fan has a small switch to toggle between 'hybrid fan control' and being constantly on. The fan will remain off in hybrid mode until the PSU reaches 20% load or 25°C, and will then progress to either Quiet Mode or Cooling Mode (50% load) – a nice touch.

XFX also touts its SolidLink technology, which

claims to reduce lost wattage by replacing internal wiring with a direct pin to port connection, allowing for higher efficiency.

Our testing rig consisted of a couple of HDDs, an SSD, 2 x GTX480 in SLI, and the Intel i7 3820 @ 4.3GHz. No matter what we connected, we were never going to get anywhere near the 1250W rating – it's simply an insane amount of power that would require an equally insane PC.

Our multimeter read 12.161v on the 12v rail when idling, 12.2v under Prime95 + Furmark, 12.2v again under just Furmark, and 12.165v during only Prime95 load. There were no fluctuations during any of these tests.

We really like this PSU for not only its efficiency, power and minimal sound output, but also the elegant design. The cost on the other hand places it squarely in the premium side of things, so unless you're absolutely certain that your PC requires 1250W (which it probably doesn't) and you have deep pockets, it may be an idea to look at a lower wattage device. 



OCZ ZT Series 650W

Bronze quality, but silver's shimmer is tempting.

Street Price \$180 Supplier OCZ

Website <http://tinyurl.com/OCZ-ZT-650>

Specifications ATX form factor; 20 + 4 pin, 2 x 4+4-pin CPU, 4 x 6+2 pin PCIe, 9 x SATA, 1 x floppy, 6 x molex

It's surprising how many people overestimate how much power they really need when it comes to designing a new PC. Spec sheets get posted on online forums every day that show an otherwise standard single GPU gaming rig, juxtaposed with an ill-advised 1000W PSU. The fault lies partly with manufacturers of processing components which recommend insane wattages for their gear, and partly cheap PSUs which fail at the very proposition of being loaded with half their rated power output. Put simply, many components overstate their PSU requirements because they assume you're using a dodgy power supply.


There's also the fact that many people see 80% efficient GPUs as meaning you can only achieve 80% of the rated power draw. For instance, a 500W PSU would be calculated as $0.8 \times 500 = 400W$. That's simply not true. What would happen is that to supply the rated 500W, the PSU will have to draw 625W from mains

power. It's a matter of wasted energy rather than lack of it.

If you're running an overclocked dual GPU rig, chances are that a high quality 650W PSU like the OCZ ZT Series 650W will be more than enough.

With its 80PLUS bronze rating the efficiency levels can be as high as 85% depending on load. The PSU performed fine under load, with the 12v rail dropping to 12.233v from 12.294v when stressed by Prime95/FurMark, 12.272v with Prime95 only, and 12.246v with only FurMark. We didn't detect any fluctuations during the tests.

A 140mm load controlled fan keeps the unit cool without compromising silence.

The ZT Series 650W offers a completely modular design and isn't too bad to look at. Although not quite as efficient as PSUs in higher price brackets, we'd be lying if we didn't say we were pleased with the performance and welcome lack of fan noise. 



Corsair Vengeance M60 Gaming Mouse

An excellent first mousing outing, but the M60 has a few niggles to overcome.

Street Price \$69 **Supplier** Altech
Website <http://tinyurl.com/Corsair-M60>

Specifications 5700 DPI; 125-1000MHz polling rate; adjustable lift distance; 8x programmable buttons; sniper button; 1.8m cable.

Choosing a mouse is one of those intensely personal things, like working out whether you like boxers or briefs, or exploring whether you like your porn vanilla, or full of furies in gimp suits. So it's impossible to really quantify an experience with a mouse beyond an admission of "well, we liked it, so you might."

Nevertheless, people seem to think we know what we're talking about, despite our tiny, girl-ish hands and an intense dislike of left-handed people. Corsair's M60 mouse, an FPS-focused rodent, scurried straight into our hearts over the Xmas break. It's part of the big new Vengeance line of gaming peripherals, alongside another mouse, two keyboards (one of which we reviewed last issue) and two headsets. Corsair doesn't do anything by halves!

Nor, it seems, does the company design by halves. For one thing, the M60 features a unique two-piece slice of aluminium that runs through the mouse, which makes up the bottom plate and supports the entire plastic structure. Like last month's K60 keyboard, this offers incredible strength. What's more, it also allows the structure of the mouse to be much more open; each 'side-panel' is a separate piece, and slightly grippy in texture, while the upper surface, which splits into the two main buttons, is far smoother. There's a lot of subtle gaps that run through the mouse, that help keep your hand ventilated during long fragging sessions – it's a clever design.

More importantly, it's comfortable under the hand, though perhaps a touch too small for some. The grippy side-panels make thumb-and-little-finger gripping very easy, and despite being

small, we never felt like our fingers had no place to go. The Sniper Button, however, is bit of a let-down. When pressed, this lowers the DPI for precise targeting, but it needs to be held the entire time, and we found it placed too far forward to comfortably use. Similarly, the two DPI switching buttons were very sticky, more prone to actuate the right mouse button than change the DPI. Neither issue is a big deal to us, since we tend to stick to one DPI in-game, but if you like to switch on the fly, it's something to keep in mind.

One design touch we really like are the weights. There are three individual weights that screw directly into the lower surface. No moving parts, no excessive spring-loaded pulleys and levers; just sensible engineering. By removing one or a combination of these weights you can even adjust the M60's center of balance, which is quite unique.

In-game performance is solid. The M60 is no



SteelSeries Sensei (www.atomicmpc.com.au/?276668) competitor, but then again it's nearly half the price. We found the M60 could easily handle the action of Battlefield 3, and after a brief tweak in Corsair's (still in beta) software, we had it working perfectly. The ability to tweak lift-off distance is great; we like to lift our mouse a lot, so by setting the M60 to not track at any height above the desk, we ended up with solid mousing. Sadly, that beta software is very obviously a work in progress, at least in terms of look. It gets the job done, though, so we can't complain too much.

Designing a great mouse with no prior experience is a tough proposition, and if anyone could do it, it's Corsair. The M60 is good, don't mistake us, but we get the feeling that it's the next iteration of Corsair mice that are going to really make an impact. On the other hand, given this is still very good, and for a very fair price, it's still a very good mouse. Not the best, but it's a long way from the worst. **DH**



Cyber Snipa Sonar 5.1 Championship

Surprisingly good 5.1 audio.

Street Price \$120 **Supplier** Digital World Warehouse
Website <http://tinyurl.com/CS-Sonar-Champ>

Specifications Drivers: 30mm (front), 40mm (center), 30mm (rear) 27mm (sub); 320hm impedance (8 for sub); 10-400Hz response (across all drivers); up to 600MW output; 3m cable; in-line controller.

While it would be great to think that we can always have the best of all possible worlds in terms of our technology, it's more common that we have to cut some corners. This certainly counts for Cyber Snipa's latest 5.1 effort, the Sonar 5.1 Championship headphones.

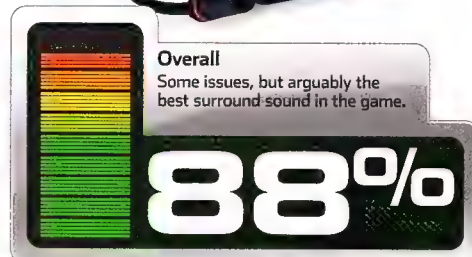
We've not liked Cybersnipas cans in the past (www.atomicmpc.com.au/?111505), and out of the box we were ready for a good round of judging a book by its cover. These are one fuckin' ugly set of headphones. Designed in black and metallic plastic, with a strip of faux leather across the headband, it's easy to start out on the wrong foot. The Championships are a little flimsy, and even though the enclosures are designed to twist flat for transport, twisting them too much causes an awful snapping noise, and unseats them from the headband.

On the head, we expected them to be a little heavy, but they sit rather light – possibly too much so. What's more, the large, circular

protuberances on the enclosures almost interrupt your peripheral vision, and certainly don't make the Championships any sexier. Finally, in our list of woe, while the mic is nice and flexible, it also feels a little too much so.

Okay, so the higher end of the audio isn't great, but the positional sound is actually rather good. There are individual drivers for front, center and rear, plus sub, and they're placed far enough apart to actually make a difference – that's why the cans look so awkward. In fact – and given the different aural sensitivity across any large group of people, you may want to take this with a grain of salt – this is possibly the best 5.1 sound we've ever heard in headphones. In Battlefield 3 you get a crisp sense of directionality and range, enough to boost immersion to almost spooky levels. As we said, high-end sounds are a little too sharp – the crack of a rifle sounds more like the crack of a twig, but that's the pay-off you're getting here.

Even with all the issues of design and build, we were still pleasantly surprised by the Sonar 5.1 Championship headphones. Though held back from Hot Award status, these are good option for people who want outstanding immersion above epic sound recreation. **DH**



Tt eSports Theron gaming mouse

It's great for RTS fans, but good for just about anyone.

Street Price \$80 **Supplier** ThermalTake
Website <http://tinyurl.com/tt-theron>

Specifications 100 - 5600 DPI; 1.8m cable; 7x buttons; 128kb on-board memory; 5x weights; carry-case.

ThermalTake is drilling down into genre-focused mice, with its first mouse designed for high-end RTS gamers, designed by Starcraft 2 super star Softball (is it bad that we've not heard of him? [Yes it is, and he's on the Tt SC2 team – Dep Ed]).

The Theron is a slick piece of kit right out of the box. As usual, Tt's thrown in a handy carry bag, a nice nod to the fact that top players will likely be pwning on the road, and the mouse itself is subtly asymmetrical and very attractive. We say subtle, because while it's clearly made with a right-handed gamer in mind, it would not be out of the question for a lefty. It sits wonderfully in the right hand, with full contact across the palm, if that's your thing, and it feels just as good if you're a side-gripper – like me. The rubber coating makes slippage unlikely, and just generally feels nice and slinky.

Sadly, RTS gaming isn't really our thing, so we didn't get quite as much out of the click-

frequency sensitive lighting.

It works, but when you suck at competitive Starcraft as much as me, you're not going to see that lighting change much – except when you lose and the clicks stop entirely! But being able to create up to 45 macros across five different profiles is pretty sweet, and certainly makes for more control while gaming, with the Theron retaining the settings once they're all set via the intuitive GUI. What really impresses us is that the mouse is still very good for day-to-day use, and for other gaming genres. BF3 played wonderfully via the Theron, and we felt no loss of control or precision, and its feet make for smooth movements on any surface, useful when you forget a mousepad.

This is another great addition to the eSports range. It's very comfortable, fully featured, and sits at quite a reasonable price. It'd be a good for any gamer, really, but for RTS fans it's almost a cut above any other mouse you could look at. Colour us impressed. **DH**



Antec Eleven Hundred

A great case of nothing special.

Street Price \$140 **Supplier** Altech

Website www.antec.com

Specifications 527 x 237 x 546mm (H x W x D); 6.9kg; 9x expansion slots; 3x 5.25in drive bays, 2x 2.5in drive bays, 6x 3.5in drive bays; 1x 200mm fan (top), 1x 120mm fan (rear); 2x USB2, 2x USB3, audio.

Antec's got a very solid name when it comes to components, and once most folks build a rig into an Antec-designed case they tend to stick with the brand. My own rig is built into one, and that of more than a few folk around the office, and we've not heard many complaints. However, the Eleven Hundred's exterior design is pared back compared to previous 'Hundred' cases. There's only a hint of the industrial styling, though the lineage is plain enough. The front fascia is nearly all mesh, with the usual array of IO options, including two USB3 ports. The real pleasure here is that this is one of the first cases we've seen with an internal connector for the faster new standard, so you no longer have to fiddle about with pass-throughs. Woot!

The top panel features well-made plastic power and reset buttons, and a raised mesh panel for the top-mounted 200mm exhaust fan. The gaps in the mesh are a bit on the wide side, so be careful not to drop screws; they do terrible damage to a system while it's running.

Both side-panels have fan mounts. The left-handed panel boasts two set in a plastic window – both partly rubber-grommited to help with silent running – while a single meshed mount is stamped into the motherboard side of the case. This is a great option to have if you really, really want to cool the heck out of your CPU, but it will make cable-management a little trickier. Just below the case window (which is very generous)

is a small tab to pull out a mesh panel that protects access to the PSU mount. We could stand to see a few more of these.

The back plate is pretty standard, with expansion backing plates that boast airflow improving cutouts and goodly-sized cutouts for watercooling.

A clean interior leaves room for a lot of build options. You can fit in CPU coolers up to 170mm, and VGA cards up to 330mm in length, and there's a tonne of room behind the mobo plate for taking cables out of the way. There's a host of cable cut-outs, too, and all are nicely grommited for protection. Even if you're not a cable-wizard, this is a great case for a neat build.

That neat build is going to be important, too, because there are only exhaust fans at stock; any cables stretching through the case will block airflow. If you're running a modern X79 system that's been built with some form of watercooling loop, it's not so important, but extra fans are otherwise mandatory.

The drive bays are cleanly designed, though they do rely on tool-less options. The optical bays have a simple push-pull mechanism (really, what's wrong with screws?!), while the HDD bays utilise a snap-on rail system. It's well-designed, complete with rubber mounting points to keep the drives quiet. The Eleven Hundred also boasts two dedicated SSD mounts.

There's an awful lot of good stuff here, but with the case market getting so crowded with great,



cheap cases from Bitfenix, and awesome higher-end models from the likes of Corsair and others, we're finding it very hard to judge just where the Eleven Hundred sits in the wider landscape. There's almost nothing wrong with the Eleven Hundred, but that only makes the few mis-steps that much more glaring. For one thing, the side panels and expansion slots are all secured by hybrid plastic/metal screws, which we just don't trust long-term. It's a good price, but only a few more dollars will get you more fans and much the same build options, too. Hell – there are cheaper cases on the market that have more fans.

Really, the Eleven Hundred is fine. But these days, fine's just not quite enough. **DH**



Build Well put together, with no rattle or infirmity.	88
Value It's a little bare for the price.	73
Cooling Adequate for some builds, but still underpowered.	70
Features Exactly what you'd expect.	80

Overall
In a competitive market, the Eleven Hundred is good, but off the pace.

79%

Beat the HEAT

Antony Leather and Paul Goodhead keep your CPU from sweating with the strain of running the latest games in the heat of summer.

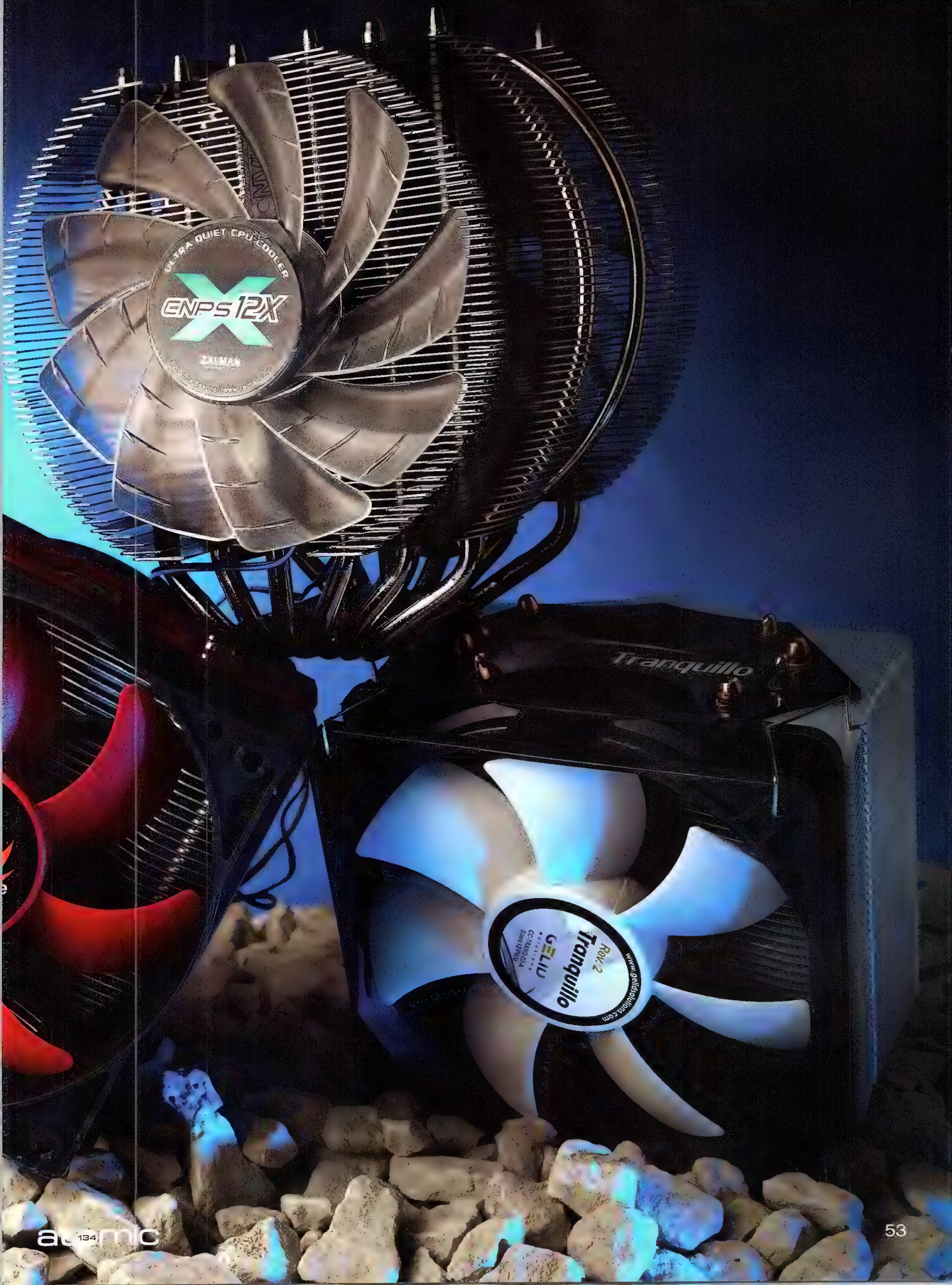
The role of a CPU cooler is simple: it should remove the waste heat produced by the CPU as quickly and as quietly as possible. As a result, the benefits of having a good cooler are clear – your CPU will run at a lower temperature, allowing for better overlocks, and your computer will be quieter, making it easier to live with.

It's amazing that such a simple goal can be achieved in a myriad of different ways; you can buy tower coolers, flower coolers, top-down

coolers, water coolers and even coolers that use liquid metal to remove heat from the CPU. How are you supposed to choose which is best for your system?

Fortunately, we're here to help. We tested a wide range of coolers on the latest Intel and AMD sockets to determine which coolers can best cope with the heat of an overclocked and overvolted processor. Whether you're after a higher overclock or just better stability when running Skyrim tweaked to within an inch of its life, we've got you covered.





How we tested

Your CPU cooler is one of the most important components in your PC. It's not only important for overclocking, but also for quickly and efficiently disposing of the waste heat your CPU generates, leaving your PC stable, and enabling your CPU to lead a long and happy life. However, there are some stinkers out there that actually perform worse than the stock cooler! We take no prisoners here at Atomic – we put each cooler through its paces by pitting it against the latest overclocked CPUs and assessing how easy they are to install and how pleasant each is to live with. After all, there's no point in having awesome cooling if your eardrums are bleeding at the same time.

Our Intel system featured a Core i5-2500K, which we overclocked to 4.1GHz using a vcore of 1.325V. The other used an AMD FX-8150 overclocked to 4.4GHz with a vcore of 1.325V. Both systems were built into a SilverStone PS03 case, with a single 120mm-fan exhaust and an

NVIDIA GeForce 9600GT graphics card.

We monitored temperatures using Core Temp (www.alcpu.com/CoreTemp/) for the Intel LGA1155 system and HWMonitor for the AMD Socket AM3+ system (www.cpuid.com/softwares/hwmonitor.html). To load each system, we ran Prime95 (www.extremeoverclocking.com) using the smallfft test until the CPU temperature reached a plateau. We then recorded the delta T temperature. This is the difference between the ambient air temperature, and the temperature reported by the monitoring program, which gives a comparable result between heatsinks as it allows for ambient air temperature fluctuations.

The score for the LGA1155 system is mostly based on how well each cooler coped with our CPU compared with the reference cooler. The reference cooler listed in the AMD results is actually similar to Antec's Kühler H20 920,

and will be available at additional cost. As such, while we've included the results, the Socket AM3+ scores are based on a calculation using the cooling results we obtained, not in relation to the reference cooler. The score also takes into account aspects such as noise, fan control and ease of installation, all the while keeping in mind the price of the heatsink. The resulting overall score is the sum of all these things.



Specifications table

	Antec Kuhler H20 920	Corsair H80	Corsair H100	Enermax ETS-T40	Gelid GX-7	Thermaltake Frio Advanced
Price	\$140	\$140	\$170	\$59	\$69	\$90
Website	http://tinyurl.com/kuhler920	http://tinyurl.com/corsair-H80	http://tinyurl.com/corsair-H100	http://tinyurl.com/ETS-T40-TB	http://tinyurl.com/GelidGX-7	http://tinyurl.com/Frio-Advanced
Compatibility						
Socket AM2/AM2+/AM3/AM3+	Y	Y	Y	Y	Y	Y
Socket FM1 (Fusion)	N	N	N	Y	Y	Y
LGA775	Y	Y	Y	Y	Y	Y
LGA1156/1155	Y	Y	Y	Y	Y	Y
LGA1366	Y	Y	Y	Y	Y	Y
LGA2011	N	Y	Y	N	N	Y
Specification						
Heatsink core material	Copper	Copper	Copper	Copper	Copper	Copper
Heatsink fin material	N/A	N/A	N/A	Aluminium	Aluminium	Aluminium
Fans (included)	2 x 120mm	2 x 120mm	2 x 120mm	1 x 120mm	1 x 120mm	2 x 130mm
Fan mounts	2 x 120mm	2 x 120mm	2 x 120mm	2 x 120mm	2 x 120mm	2 x 120mm
Fan speed (rpm)	700 - 2,400	1,300, 2,000 or 2,500	1,300, 2,000 or 2,500	800 - 1,800	800 - 1,600	800 - 2,000
Fan speed control	Manual and automatic	Manual	Manual	PWM	PWM	PWM
Stated noise (dBA)	Up to 43	22 - 39	22 - 39	16 - 26	10 - 26.8	16 - 46
Power connector	3-pin	3-pin	3-pin	4-pin	4-pin	4-pin
Illumination	Y	Y	Y	N	Y	N
Dimensions (mm) (W x D x H)	120 x 99 x 151 (radiator and fans)	120 x 88 x 152 (radiator and fans)	122 x 77 x 275 (radiator and fans)	139 x 93 x 160	130 x 90 x 159	130 x 122 x 159
Extras						
Thermal interface material	Unbranded	Unbranded	Unbranded	Dow Corning TC-5121	GC-2	Unbranded

Antec Kühler H2O 920

This cooler is cool, ja.



Powerful software;
lots of flexibility;
looks good.



Quite expensive for
a cooler, may not be
compatible with all cases.

Street Price \$140

Website <http://tinyurl.com/kuhler920>

Specifications Socket Compatibility: Intel LGA 775, 1155, 1156, 1366; AMD AM2, AM2+, AM3, AM3+; 2x 120mm PWM LED fans 700-2400RPM; Software monitoring.

The Kühler H2O 920 is made for Antec by Asetek – the same company that made Corsair's all-in-one water-cooling systems such as the H50 and the H70. The DNA that the Kühler shares with these coolers is clear too; the mounting system, radiator and CPU block are all very similar.

The mounting mechanism that Asetek coolers use is simple. You screw a circular mounting bracket into a backplate, before dropping the waterblock between the notches in the bracket, rotating it so that the notches clip into the waterblock. You then tighten the screws, fixing the bracket to the backplate.

You'll need a rear or roof-located 120mm fan mount, and if you have a medium or large tower case, the rest should be easy. Unlike Corsair's directions to intake air from the outside of the case with its H80, Antec specifies that the Kühler should be set up to

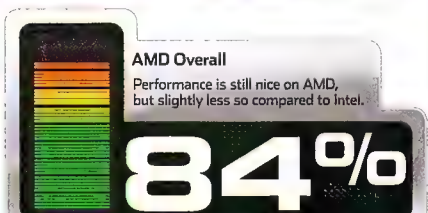
exhaust air from the case.

In our LGA1155 test system, the Kühler cooled well when at its extreme setting; its delta T of 36°C was one of the best we saw. Switching to the silent preset saw temperatures rise by 12°C. This places the Kühler towards the bottom of the table, although it was barely audible at this setting.

The Kühler has a software interface that allows you to adjust the fan speeds to a custom setting. This is a key feature, giving you the ability to adjust the noise-to-cooling ratio. The cooler also fared well in our AMD test rig, as it was able to remove the heat from the CPU quickly on its highest speed. Our CPU reached a delta T of 47°C, which was only bettered by the larger Corsair H100 and the Corsair H80; the latter had the advantage of acting as an intake rather than an exhaust.

At \$140 the Kühler H2O 920 isn't cheap, and is similar in price to its competition, but it's a class act thanks to its ability to switch between


superb cooling and quiet operation (and anything in between, for that matter) at a moment's notice – an out-of-the-box feature sorely lacking with Corsair's coolers.




Corsair H80

Go against the flow.



 Respectable cooling; easy to mount

 Dumps heat in the case; no fine-grained speed control.

Street Price \$140

Website <http://tinyurl.com/corsair-H80>

Specifications Socket Compatibility: Intel LGA 775, 1155, 1156, 1366, 2011; AMD AM2, AM2+, AM3, AM3+; 2x 120mm PWM fans 1300-2500RPM.

The Corsair H80 is made by CoolIT and is part of the company's new generation of all-in-one liquid coolers. It has a new micro-channel copper cold plate that Corsair claims offers better heat dissipation over older models. It's manufactured using a process that's proprietary to CoolIT called Micro Deformation, which they claim allows waste heat to be transmitted from the CPU to the cooling fluid very efficiently.

The new control unit serves as a hub for the two 120mm fans included with the H80, providing three fan speeds. The CPU block then plugs into the motherboard via a 3-pin fan header. The unit sports a third connection that will allow the cooler to link up to Corsair's Link system – according to Corsair, this will offer better fan control. The hoses connect to a full-depth radiator, using the two fans in a push-pull configuration.

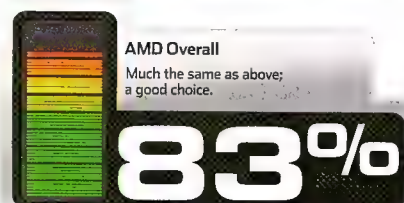
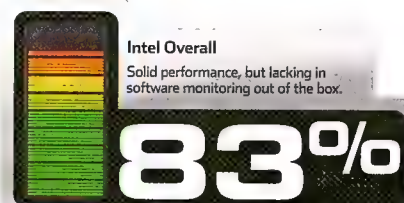
On LGA1155 systems, four screws attach the CPU block to a backplate via a mounting bracket that screws to the CPU block itself – a simple task. On AMD systems, the H80 uses the standard AMD retention bracket, with two loops hooking over the bracket clips.

Corsair specifies that the radiator fans should act as intakes. Pulling in cool air from outside the case will mean better CPU cooling but dumps heat back into your case, which isn't ideal.

At high speed, it was the joint-best performer on both our test rigs, despite not being as loud as the Antec Kühler H20 920. It also performed well at low speed on our Intel test rig, with temperatures rising by just 5°C. Our AMD system is far more demanding, however, and at low speed the H80 only just managed to tame our overclocked FX CPU. As the H80 acts as an intake, the graphics card on our AMD test machine ran noticeably hotter than with other coolers fitted.

We have concerns about using the Corsair H80 as an air intake unless you have at least

one other fan acting as an exhaust. This is especially true if your CPU is heavily overclocked, but we can't deny that the H80 is simple to install and use, can be very quiet, and offers superb cooling.



Enermax ETS-T40-TB

Vortexing and stacking doesn't save the T40.



Easy to fit; easy fan clip; clear instructions



Unable to adequately cool an overclocked AMD FX processor

Street Price \$59

Website <http://tinyurl.com/ETS-T40-TB>

Specifications Socket Compatibility: Intel LGA 775, 1155, 1156, 1366, 2011; AMD AM2, AM2+, AM3, AM3+, FM1; 1x 120mm PWM fan 800-1800RPM.

Enermax already makes PSUs and fans, and the ETS-T40-TB is one of its new CPU coolers. It feels solid, and fits the mould of a standard tower cooler. Snaking up from contact plate are four copper heatpipes, which make direct contact with the CPU heatspreader. This is a low number compared with some of the other coolers out there, but it does sport some funky cooling fins, which Enermax claims aids heat dissipation and reduces thermal resistance.

There are small bumps on the fins, which create what Enermax grandly calls vortex generator flow. In short, they channel cool air into the dead spots behind the heatpipes, meaning that more heat can pass from the pipe to the air around it. There are also four small cut-outs on each of the fins, which according to Enermax generate a stack effect-flow, whereby warmer air trapped between the lower fins rises

up through the stack and is expelled.

A 120mm Enermax T.B. Silence PWM fan is included, which features distinctive ribbed blades (the cooler is also available with illuminated fans). This attaches using a pair of retention clips. Enermax seems to have completely revolutionised the world of fan-retention clips, as these are actually simple and easy to use, which blew our minds.

Mounting the cooler is easy, helped by the clear instructions and the small size of the heatsink. Ease of mounting won't keep your CPU cool, though, and in this regard the ETS-T40-TB was a huge letdown.

On our LGA1155 test system, the cooler only achieved a delta T of 47°C, which is hotter than that of similarly priced models. The situation became even worse for the ETS-T40-TB when we strapped it to our AMD rig – after ten minutes of stress testing the computer restarted, as the CPU became too hot.

This cooler failed our AMD test, which means

that we can't recommend the ETS-T40, even though it's easy to fit. Despite its clever wizardry, we'd suggest an alternative.

Intel Overall

It mounts easily, and seems to keep things stable.

66%

AMD Overall

Also mounts easily, but fails under the heat. Avoid.

21%

Corsair H100

When one is good, two must be better.

Street Price \$175

Website <http://tinyurl.com/corsair-H100>

Specifications Socket Compatibility: Intel LGA 775, 1155, 1156, 1366, 2011; AMD AM2, AM2+, AM3, AM3+; 2x 120mm PWM fans 1300-2500RPM.

All-in-one water-cooling kits have come a long way in the past couple of years. Anyone who has been reading long enough to remember the Corsair Nautilus (www.atomicmpc.com.au/?60707) will know that they used to be expensive, unattractive and usually highly ineffective. Some were even worse at cooling overclocked CPUs than the relevant reference cooler – a particularly damning situation. The same can't be said for the current crop of sealed-loop efforts though; they dominate the top of our cooling charts.

Like the H80, the H100 is compatible

not only with our Socket AM3+ and LGA1155 motherboards, but also with Intel's new LGA2011 CPU socket. It's made for Corsair by CoolIT, a Canadian company with a long history of producing sealed-loop liquid coolers under its own name. This is a change for Corsair, as most previous models were made for it by Asetek. As you can tell from its name, the H100 resides above the H80 in Corsair's cooling range, as it's equipped with a dual 120mm-fan radiator – the other water-cooled models on test sport only single-fan rads.

We're glad that Corsair has finally taken the plunge, though, as the H100 looks and feels a lot more meaty than 120mm radiator coolers such as the H80. The actual fin area is unlikely to be significantly greater, though, as the H100's radiator isn't as deep – a move that Corsair has probably made in order to reduce the headroom

As the most expensive cooler on test, the H100 had to perform well in our test systems to justify its asking price.

required to fit it, improving compatibility.

You'll need room in your case to be able to mount the radiator, which is still likely to be a stumbling block for most people. More cases are equipped with dual-radiator mounts in their roof these days, but failing that, there's always the option to take matters into your own hands and turn that single 120mm roof mount into two with some help from your ol' pal Dremel. If you do this, though, you'll want to make sure the tubes reach the mounts; they're only 320mm in length and may struggle to reach in taller cases.

As with the H80, the CPU block houses the pump that keeps the water flowing around the loop. It also acts as a hub for the fans attached to the radiator of the unit. Corsair bundles the H100 with two fans but there's the possibility of adding another two so that the four fans are arranged in a push-pull configuration, as there are four fan ports on the CPU block. You can plug the fans into the motherboard as usual if you wish, but if you do, you'll miss out on the speed controller built into the CPU block. This is operated by pressing the button in the centre of the block to flick between the three built-in profiles. It's a nice touch but it means that you'll have to remove the side of your case if you feel you need to step up (or down) the cooling profile.

The CPU block also sports a Corsair Link connection, which will allow you to connect the cooler up to a Corsair Link kit. This will allow full

control of all the different settings that the cooler sports, such as fan and pump speed. This is a good idea, but it's a little galling that you have to buy the US\$99 Corsair Link unit separately, especially when Antec bundles software that allows you to do essentially the same thing with its Kühler H20 920 for free.

Mounting the H100's CPU block is performed in the same way as the H80's. It's a simple process, and the instructions bundled with the cooler are very clear. As with the H80, the H100 uses the stock AMD mounting bracket if you're installing it on a Socket AM3+ system. This is an uncommon choice but the fit is secure enough.

As our test case didn't have the correct mounts internally, we opted to mount it externally using a radiator box, and pass the block and tubes through the I/O panel (the plate for this is always absent in our cooling tests for practical





Lots of thermal headroom;
quiet on low speed.



Very large;
might not fit in all cases.

reasons). As the most expensive cooler on test, the H100 had to perform well on our test systems to justify its asking price, something it just about managed in our LGA1155 test system. Its high-speed delta T of 36°C was the joint-best result on test, matching those of the H80 and Antec Kühler H20 920. Dropping the H100 down to medium fan speed saw temperatures rise by only 1°C, which is a good result, as the cooler was less audibly invasive on medium speed than it was on full speed. At low speed, which was extremely quiet indeed, the H100 returned a delta T of 40°C, which is still better than most of the air coolers on test.

Switching to our AMD test rig revealed that the H100 is also able to cope with an overclocked AMD FX CPU on each of its three speed settings. Again, there wasn't much difference in temperature between the three speed settings –

high speed returned a delta T of 46°C while low speed returned 52°C.

We can't deny that the H100 is a piece of impressive cooling kit – it can cope with one of the hottest processors we've seen, even at its quiet low fan speed, and it costs a heck of a lot less than a custom water-cooling kit. Unfortunately, it's a difficult piece of kit to recommend unequivocally, as not everyone will have the requisite pair of 120mm fan mounts in their case.

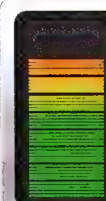
A further problem for the H100 is the presence of the cheaper but equally competent Antec Kühler H20 920, which can be mounted more easily. The latter also includes Antec's excellent fan control software as standard. While Corsair's Link kit will offer similar features, it costs extra, giving the Kühler H20 920 a further advantage in the value stakes. Corsair's H80 is also a better bet if you're an AMD enthusiast.



Intel Overall

Solid performance, but lacking in software monitoring out of the box.

82%



AMD Overall

Much the same as above; a good choice.

80%

ThermalTake Frio Advanced

Turns out that 'Advanced' doesn't mean 'better'.

Street Price \$90

Website <http://tinyurl.com/Frio-Advanced>

Specifications Socket Compatibility: Intel LGA 775, 1155, 1156, 1366, 2011; AMD AM2, AM2+, AM3, AM3+, FM1; 2x 130mm PWM fan 800-2000RPM.

We feel like proud parents when it comes to the ThermalTake Frio. We were there when it first burst onto the scene, all new and fresh-faced with its pair of powerful fans, clean styling and excellent cooling ability. We've also seen it develop and pass through its difficult teenage years where it listened to screams and face-melting metal. Now the Frio has developed again (or, if you'd prefer, gone through a mid-life crisis) and has come out the other end as the Frio Advanced, a cooler that ThermalTake claims is designed to deal with overclocked CPUs.

The Frio Advanced also mimics the original Frio when it comes to its cooling fins, which are arranged in a single continuous stack. These fins are densely packed and extremely sturdy, giving the cooler a feeling of solidity. This robustness is a result of the fact that the fins are clipped together on each of the four corners of the stack, rather than one point on the side of the stack, as is typical. Screwed to the top of the fin stack is a plastic end plate that does its best to hide the ugly crimped end of the cooler's heatpipes. It isn't as tidy as the brushed aluminium end plates that you'll find on expensive coolers like the Megahalems, but it's better than just leaving the top of the cooler plain. It's LGA2011-compatible out of the box too.

One of the most obvious changes to the Frio Advanced is its fans, which are special oversized

One of the most obvious changes to the Frio Advanced is its fans, which are special oversized versions – noticeably deeper

The Frio Advanced is a nicely designed heatsink, and harkens back to the original red and black colour scheme of the original Frio. This is a good thing, as weirder schemes like acid green and sky blue look and feel tacky.

versions – they're noticeably deeper than regular 120mm fans. The frame of the fan has been extended so that despite using 120mm mounts, it's actually a 130mm fan. When coupled with the extra depth of the fan, this should mean there will be a serious amount of air rushing through the fins of the Frio Advanced. Sadly, there's no manual fan speed control, as there was with the original Frio – the Advanced is equipped with 4-pin PWM fan headers instead.

One frustration with the fans, however, is that their direction of flow isn't labelled. This is annoying, as

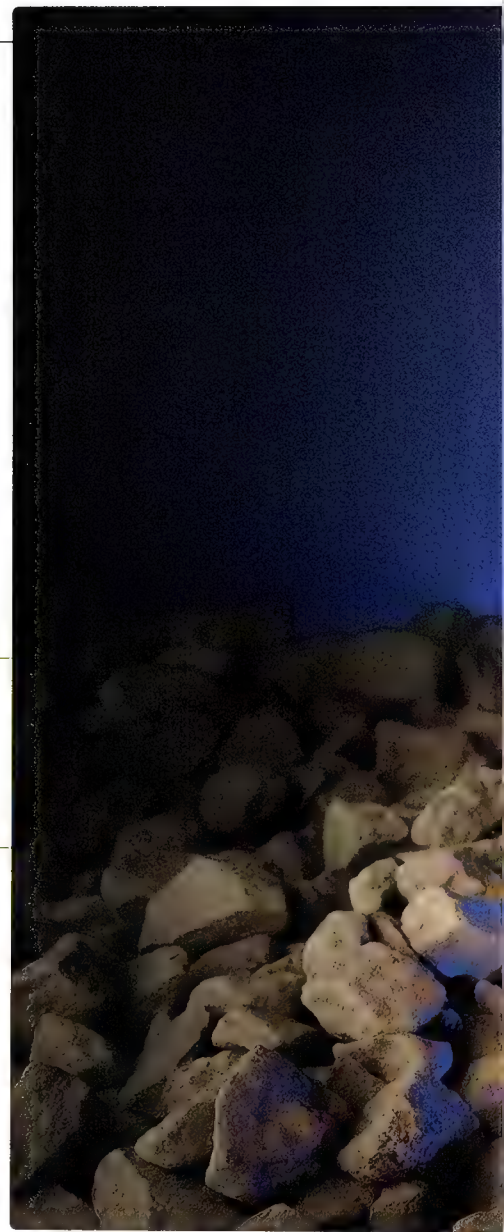
one fan has a reversed bearing, and it's always best to remove the fans when attaching the cooler. We'd advise making a note of which way they attach to make sure your cooler is blowing air in the right direction when you boot up your PC.

The Frio Advanced is arguably a little underwhelming on the heatpipe front, especially when compared with its predecessors. It has five 6mm copper heatpipes transferring heat from the contact plate to the fin stack above it, which is one fewer than we'd

like. Granted, it's the same amount as the original Frio, but that cooler used chunkier 8mm versions that had a higher heat transfer capacity.

To offset this reduced heatpipe capacity, ThermalTake has routed the heatpipes to the bottom of the CPU contact plate so that they make direct contact with the processor heatspreader. At this point, we'd usually moan that this results in large gaps in the contact plate but ThermalTake has managed to machine the plate so that it's completely flat – the joins between the heatpipes and the aluminium of the contact plate are completely flush. This not only looks great but should also ensure optimal heat transfer to the heatpipes.

Mounting the Frio Advanced to your motherboard isn't the simplest of tasks, as there are a lot of components involved in the process.





Innovative fans; solid mounting mechanism



Noisy; no manual fan speed control

You begin by attaching a backplate to the rear of the motherboard before attaching two horizontal crossbars to it. You're then asked to attach two spring-mounting screws to the CPU cooler contact plate. These screw into the two crossbars that you attached earlier in the process, securing the cooler to the CPU. Thankfully, the instructions bundled with the cooler are clear, so any Joe Blow worth his salt should be able to manage the process relatively painlessly.

Once we'd attached the Frio Advanced to our test system, we were pleasantly surprised by the results we saw. In our LGA1155 test system, the CPU levelled out to a delta T of 41°C, which is towards the top end of the results we've seen here. In fact, no other air cooler bettered the Frio Advanced in this Head2Head.

Unfortunately during our testing, the Frio

Advanced spun up to almost ridiculous levels. It was by far and away the loudest component in the case, and the only other coolers that could match its racket were the water-cooling systems at their highest fan speed settings. Our AMD testing revealed a similar story, with the cooler performing well (it recorded a delta T of 48°C), but only by spinning up its fans to an uncomfortable level of noise.

The Thermaltake Frio Advanced is a bit of a disappointment given the pedigree of the original Frio. Your motherboard may be able to alter its fan profile to quieten the otherwise noisy pair of 130mm fans, but it's a shame that Thermaltake has decided to ditch manual fan speed control. The original Frio still performed well with its fans set to minimum speed. We'd recommend buying that instead.

Intel Overall

It's alright, but we feel burned by the lack of fan control.

62%

AMD Overall


Also a slight burn from the noise.


66%

Gelid GX-7

The bearing still has flux in it, it's just nano-sized, alright?



 Competent on Socket AM3+; flexible mounting bracket

 Performance could be better

Street Price \$69

Website <http://tinyurl.com/GelidGX-7>

Specifications Socket Compatibility: Intel LGA 775, 1155, 1156, 1366, 2011; AMD AM2, AM2+, AM3, AM3+, FM1; 1x 120mm PWM fan 600-1800RPM w/ Nanoflux Bearing.

Gelid splits its product line-up into two distinct segments – silent and gamer. The Tranquillo is a member of the silent group of products, while the new GX-7 carries the gaming tag. As a result, it's meant to offer more cooling punch and fancier looks.

It's more in your face than the Tranquillo, too, with its engine block-inspired plastic top fascia and bright blue Wings 12 fan. It packs more heatpipes, with seven 6mm heatpipes connecting the contact plate to the fin stack. This is surprising in a cooler that isn't much larger than the Enermax T40, which only uses four heatpipes.

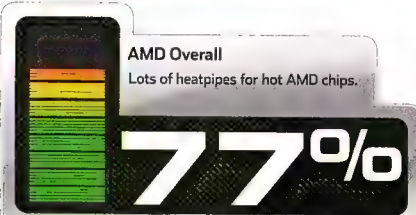
Gelid points out that fitting seven heatpipes to a cooler isn't usually all that beneficial, as it's difficult to transmit heat from the CPU to all seven heatpipes evenly. Gelid has sidestepped this problem by arranging the heatpipes in a stack with five at the bottom and two on the

top, as they pass through the mounting block. This, Gelid claims, allows for more even heat transfer and better cooling.

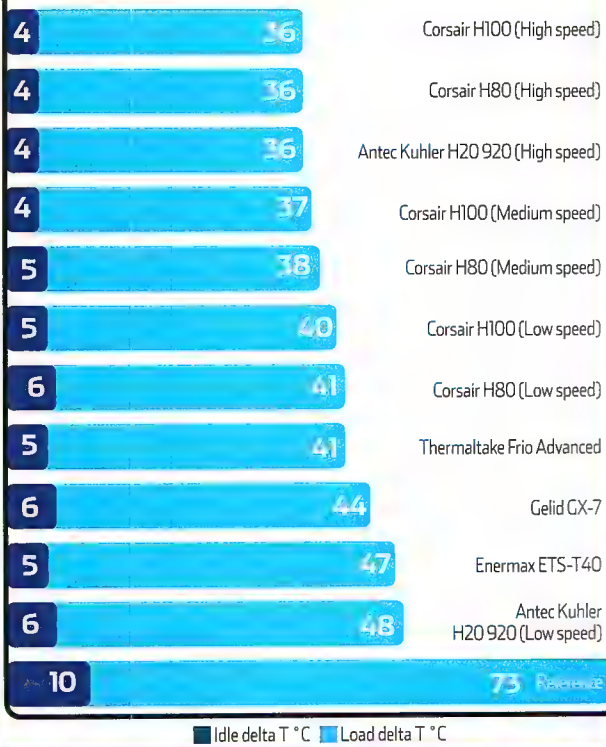
The GX-7 uses the same mounting bracket as their other products. It also means that owners of AMD systems have the option to mount the cooler in whichever orientation they want – a rare feature. Sadly, the GX-7 returned average results in our LGA1155 system with a delta T of 44°C. Its extra heatpipes made a difference when it came to our AMD system, though, as the GX-7 cooled our test chip to a delta T of 56°C; Enermax T40, which failed this test. This result lends weight to our belief that heatpipe count is particularly important when cooling an AMD processor.

While the Gelid GX-7 proved competent in our AMD system and was able to tame our toasty, overclocked FX-8150 CPU, it was still a fair way behind more expensive all-in-one watercoolers. Its LGA1155 performance was on a par with that

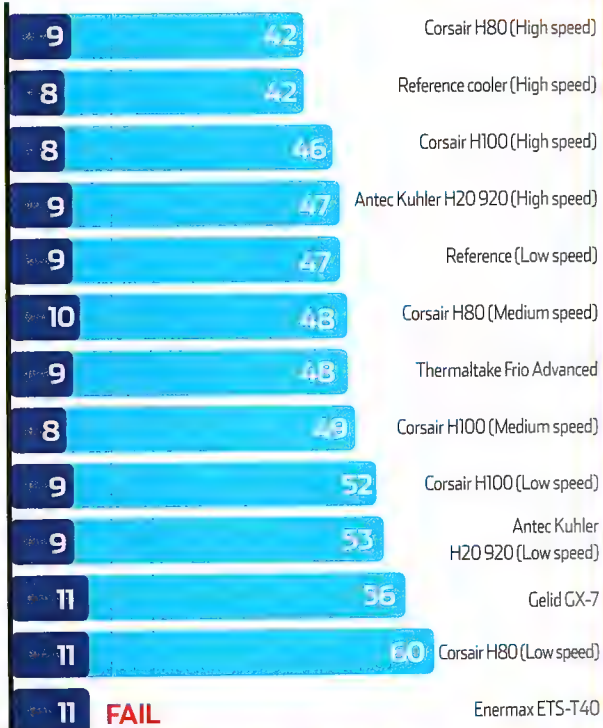
cheaper heatsink coolers. This means the GX-7 is a decent choice, but not a fantastic one.



INTEL LGA1155



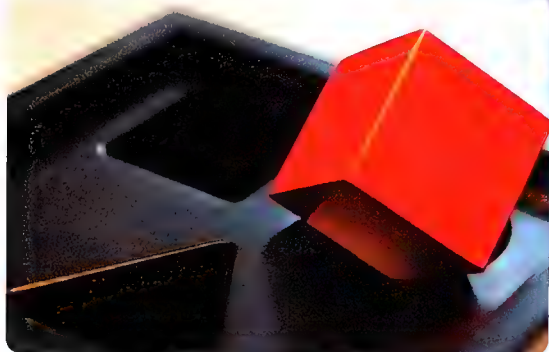
AMD SOCKET AM3+



KITLOG

These are four of our basic systems, with something for every taste. **The Game Box** is put together with money-saving in mind, but also an eye to getting as much bang for buck. Our build may be a little more expensive than what you could technically get away with, but for that extra few hundred you're also getting cutting edge performance and one of the most overclockable chips you can get today.

The process of putting a PC together is relatively simple, and almost anyone can do it. The hard part, as many will ultimately discover through trial and error, is getting a good rig at the end of it. Builds featured here are a great starting point for any user; but we always recommend customising for your particular needs. There's no point cramming a fast GPU in if you never play games!

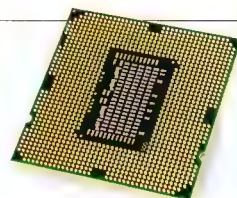


The Perfect PC, on the other hand, is the system everyone aspires to, with nothing but the best parts – without going crazy, though. It's a collection of all the greatest hardware that we'd pick without a budget, sure to impress with performance and sheer style.

Oh, and if you're wondering what the Ref IDs are, that's the ID of that article on our website. Just enter it like this – www.atomicmpc.com.au/?NUMBER – and you'll go straight to that review.

THE GAME BOX

CPU



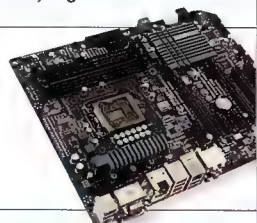
Intel Core i5 2500-K
PRICE \$220

Sandy Bridge's combination of cost and overclocking prowess is awesome.
Issue 122, Page 36

MOTHERBOARD

Gigabyte Z68X-UD3H-B3
PRICE \$170

Affordable gaming performance and features.
Ref ID: 263631



MEMORY



G.Skill Ripjaws F3-10666CL7D-4GBRH
PRICE \$45

Great value, tight timings, and some flexibility.

VIDEOCARD

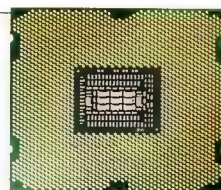
NVIDIA GTX560
PRICE \$220

A reference-design card, but plenty fast for gaming bliss.
Issue 116, Page 38



THE PERFECT PC

CPU



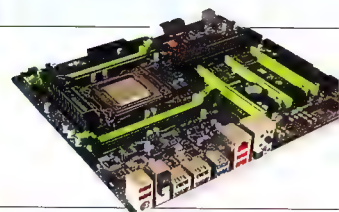
Intel Core i7 3930K
PRICE \$700

Six cores of Sandy Bridge-E loving. Overclock for justice!
Issue 132, Page 32

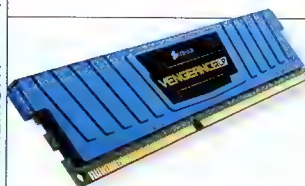
MOTHERBOARD

Gigabyte G1.Assassin 2
PRICE \$470

It's about as super-premium as you could get, or want.
Ref ID: 281856



MEMORY



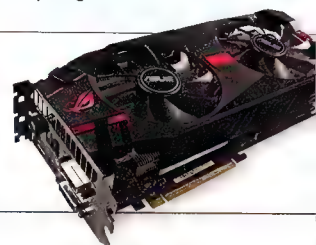
Corsair Vengeance Low Profile CML16GX3M4A1600C9B
PRICE \$100

16GB of fast memory. Virtualise everything!

VIDEOCARD

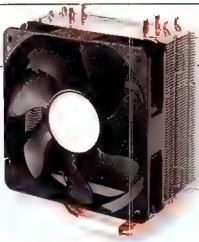
ASUS Matrix Platinum GTX580
PRICE \$750

A beefy single-core card with thermals to match.
Ref ID: 274735



SUBTOTAL: \$1508

RIG ONLY: \$1049



Coolermaster Hyper 212+
PRICE \$40

Nice cooling for a very affordable price.

CASE



Bitfenix Shinobi
PRICE \$79

Worth it for the price alone, and sexy to boot.
Ref ID: 260177

2TB HDD
PRICE \$90

Two thousand gigabyte storage drive on the cheap.



Pioneer DVR-219L
PRICE \$35

Discs. You needs 'em.

KEYBOARD

Razer Arctosa
PRICE \$50

A cool-looking keyboard that'll serve you very well.
Ref ID: 149483



Samsung S24A450BW
PRICE \$260

24 inches of LED backlit, 16:10 LCD screen. Sweet.

MOUSE



Corsair Vengeance M60
PRICE \$69

Exceptional mousing value.
Issue 134, Page 49

Plantronics Gamecom 777
PRICE \$80

Solid set of cans with great audio.
Issue 101, Page 41



Onboard Realtek ALC889A

A decent chip that does the job.

POWER SUPPLY

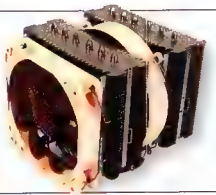
Corsair HX-650
PRICE \$150

A solid PSU, ready to power anything you throw at it.



SUBTOTAL: \$5259

RIG ONLY: \$3935



Noctua NH-D14 CPU Cooler
PRICE \$95

Bulky, yet quiet and effective. Or skip this entirely and water-cool!
Issue 122, Page 47

CASE

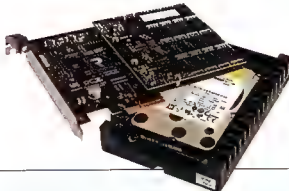


SilverStone Temjin TJ11
PRICE \$600

The best and only case you'll ever need. Premium luxurious bliss.
Ref ID: 257544

OCZ REvo Drive x2 & WD 600GB VelociRaptor

PRICE \$580 + \$320
Superfast SSD with zippy storage.
OCZ: Issue 121, Page 43
WD: Ref ID: 220323



KEYBOARD

Razer BlackWidow Ultimate

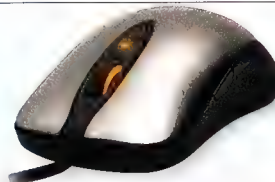
PRICE \$160
The new benchmark in gaming quality.
Ref ID: 251095



Dell U2410
PRICE \$699

In-Plane Switching, 1.07 billion colours and 24 inches.

MOUSE



SteelSeries Sensei
PRICE \$115

The best-performing mouse we've used to date!
Ref ID: 276668

ASUS Xonar Xense
PRICE \$350

Odd package, but the card alone is awesome.
Issue 124, Page 41



POWER SUPPLY

Antec HCP 1200W
PRICE \$320

Plug in a graphics card. Or four. The HCP won't care.
Ref ID: 272588



The **LAN Rig**, the ultimate in portable gaming power – go anywhere, frag anyone. No longer will you be tied to a desk or forced to awkwardly manhandle your full-sized rig, helped by a convenient handle and beefy tech. Perfect for wowing people at LANs, the tech inside is fast enough to run any game, and boasts enough speed to keep your game running at full clip even if other programs intrude in the background. After all, no-one wants to miss a headshot.

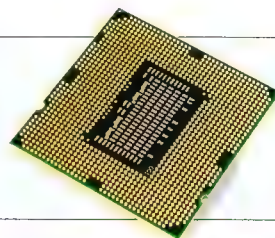
There are times when a soundcard can't cut it for your audio desires, where your 600ohm headphones feel underpowered and you need more OOMPH. Thankfully there's a market to cater for you, and multiple Digital-Analogue-Converter/Amplifier hybrids are on the market, such as the ASUS Essence One or Matrix Mini-I. They give much better audio quality, and the punch needed to enjoy music to its fullest. Only serious enthusiasts need apply.



Finally, for the more entertainment-minded – and really, that's all of us – there's **The Mini**, ready to play movies and music quietly and efficiently. The basic guts are fast enough for general tasks, and the IGP can handle High-Definition content. You can also choose from three entirely optional upgrades to suit your needs best: a graphics card for WoW, TV tuner to catch the game, or a Wireless card to sync without cables. The perfect energy-conscious build.

THE LAN RIG

CPU



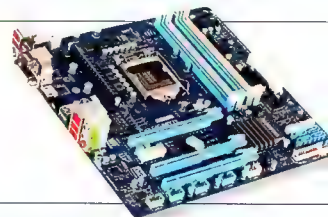
Intel Core i5 2310
PRICE \$190

Intel's most affordable quad-core, overclocking limited.

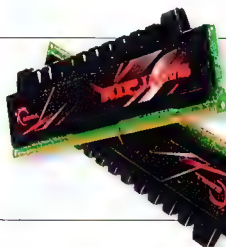
MOTHERBOARD

GIGABYTE Z68MA-D2H-B3
PRICE \$150

A mATX board with everything you need.



MEMORY



G.Skill Ripjaws F3-10666CL7D-4GBRH
PRICE \$45

Great value, tight timings, and some flexibility.

VIDEOCARD

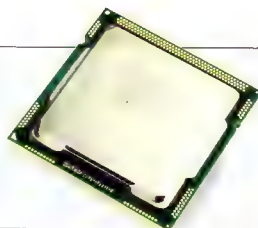
NVIDIA GTX 560
PRICE \$220

A reference-design card, but plenty fast for gaming bliss.
Issue 116, Page 38



THE MINI

CPU



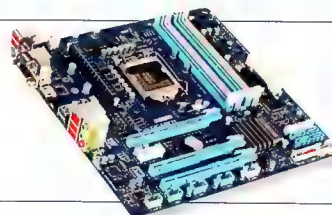
Intel Core i3 2100T
PRICE \$150

Super low-heat dual-core processor with IGP.

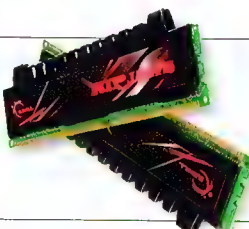
MOTHERBOARD

GIGABYTE Z68MA-D2H-B3
PRICE \$150

A mATX board with plenty of storage options.



MEMORY



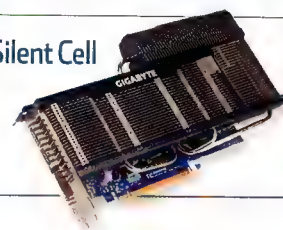
G.Skill Ripjaws F3-10666CL7D-4GBRH
PRICE \$55

4GB of fast memory is plenty for running multiple HTPC media streaming apps.

VIDEOCARD

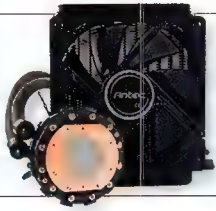
Gigabyte HD6770 1GB Silent Cell
PRICE \$145

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SUBTOTAL: \$1401

RIG ONLY: \$1050



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PRICE \$90

Show off your 1337 rig with watercooling. Aw yeah.

CASE

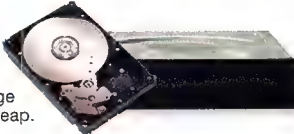


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PRICE \$35

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Ref ID: 149483



Corsair Vengeance M60
PRICE \$69

Exceptional mousing value.
Issue 134, Page 49

MOUSE



Corsair HX-650
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A solid PSU, ready to power anything you throw at it.



Corsair Vengeance M60
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Exceptional mousing value.
Issue 134, Page 49

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Issue 101, Page 41



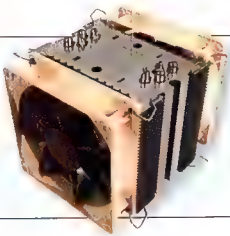
Onboard Realtek ALC889A

A decent chip that does the job.

POWER SUPPLY

SUBTOTAL: \$1455

RIG (NO OPTIONS): \$1070



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Plenty of cooling, and quietness to boot.

CASE

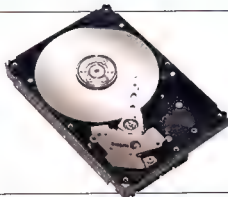


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PRICE \$80

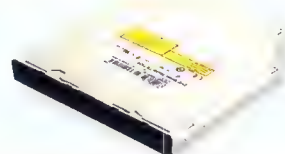
Slot-loading DVD drive for movies, installs or backups.

KEYBOARD



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Zippy 802.11N for wireless HD video streaming.

POWER SUPPLY

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"Look, ma, no fans!"
-Anonymous, 2011





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Stomp, don't sprint

Daniel Rutter is tired of briskly bounding bots.

I love giant robots. Who *doesn't* love giant robots? Strange little people with no friends and chronic skin problems, that's who.

But there's a problem with some giant robots: they're not actually giant. Not really. There's something wrong with their physics. Specifically, their gravity.

Earth gravity is about 9.8 metres per second squared. If you drop an object near the surface of the earth, and it's got enough room to fall, it'll be moving at 9.8 metres per second after the first second of falling (ignoring air resistance), 19.6 m/s after second two, and so on.

Trying to walk at a normal human pace will leave your huge titanium legs flapping in the air

Gravity is, of course, the same for everybody. Ants, people, buildings, fictional giant robots. But if you're a ten-millimetre-long ant, nine point eight metres per second squared is 980 times your body length per second squared. If you rear up on your hind legs and then lean forward a little bit, you'll be on the ground almost instantly.

In a similar situation, a two-metre-tall human will take 200 times as long to hit the ground. Which is just as well, since the square-cube law makes humans a lot more susceptible to falling damage than ants, and we need time to try to get our arms out in front of us.

OK, now let's look at a 20-metre-tall giant robot. If your brain was transplanted into this magnificent body, standard gravity would look, to you, the same as a tenth of a gee would to a two-metre human. That's less than lunar gravity. So, in order to walk with a human-like gait, you'd have to take proportionally slower steps, because walking is essentially a controlled fall. Trying to walk at a normal human pace will leave

your huge titanium legs flapping in the air, as you majestically fall over.

You could sort of scuff your feet and push yourself forward and not up, but then you'd just dig trenches with your feet, like someone in an old-fashioned diving suit trying to run across the ocean bottom.

Some giant-robot scenarios take this into account, one way or another. But in most of them, the robots walk and run pretty much like humans – perhaps a bit slower, but not nearly slowly enough to match their size.

The result is like using player.setscale in a

Wars AT-ATs conceal the problem by being quadrupeds that only lift one foot at a time, but the zippy chicken-walking AT-STs are more than a little too fast.

Mechwarrior Phoenix, the greatest trailer ever created for a game that does not exist, gets it very close to right. The upcoming *Hawken* is the opposite, though; it's a fast-action deathmatch game, so its robots all run and fall too fast. Perhaps they, and the mecha in *Cyber Troopers Virtual-On*, are on a 5-gee planet.

Giant robots hopping around like caffeinated kindergarten kids really spoil the whole illusion for me. And, with any luck, they now spoil it for you too.

Don't all thank him at once.
dan@atomicmpc.com.au

Bethesda game to become a giant. You still move just as you did before, so it looks as if the world's shrunk, not as if you've grown.

The game I first really saw this in was *Shogo: Mobile Armor Division* in 1998. That game has on-foot and giant-robot sections, which look and feel the same.

The gigantic... let's call them robots... in *Neon Genesis Evangelion* move like people too, despite being big enough to use skyscrapers as furniture. They've got magical hypertechnology, though, so maybe they're sucking themselves onto the ground with a tractor beam. This could also account for the whole "skating robot" genre of games and anime, your *Armored Cores* and such, which I try to pretend does not exist.

But that's clearly not the case for more "realistic" giant-robot scenarios, such as "dieselpunk" anime like *Gear Krieg* or *Steel Battalion*.

The *Steel Battalion* games do it pretty well, actually. The various *MechWarriors*, and *ChromeHounds*, are also not too bad. *Star*



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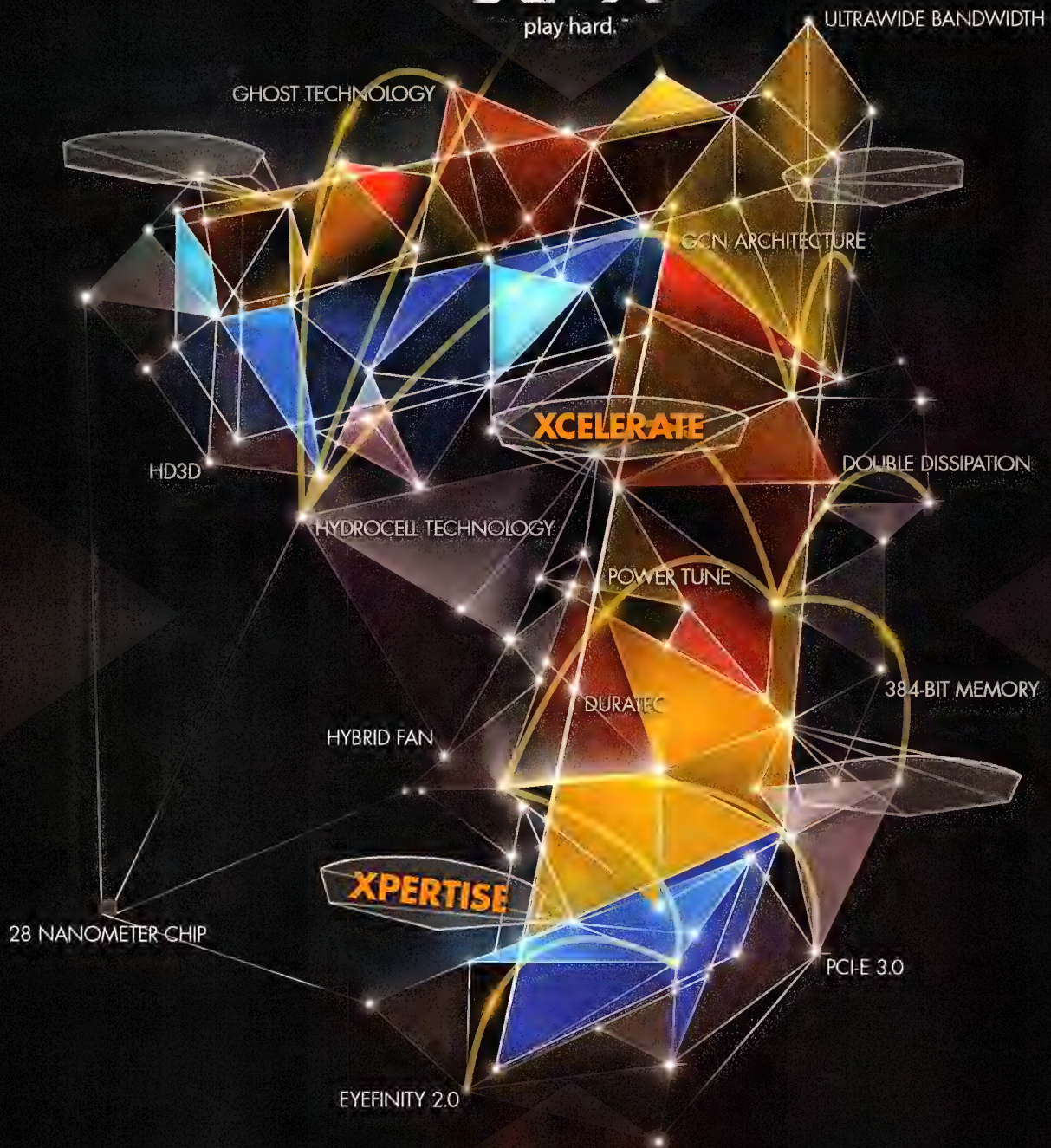
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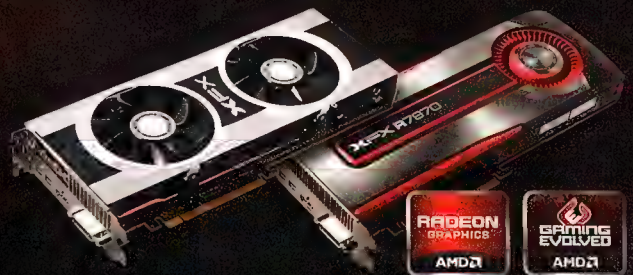
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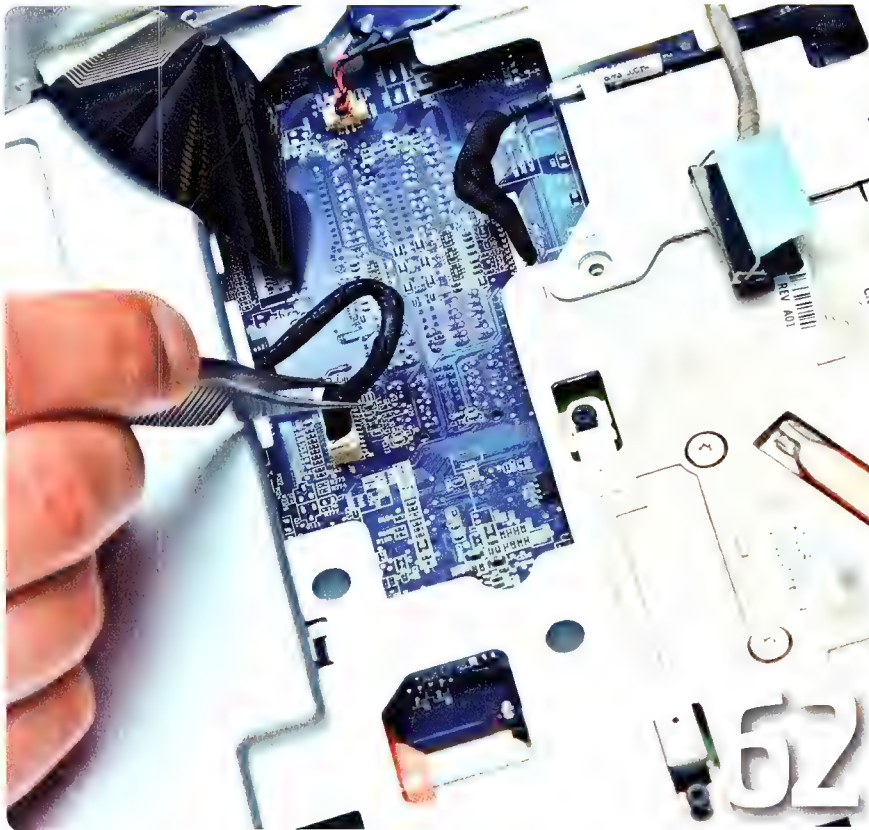
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TUTORIAL

HANDS-ON TUTORIALS FOR THE TECHNICALLY MINDED



TUTORIAL CONTENTS

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Chris Taylor reckons the life of a technician may suit your skills.
- HOW TO: SLEEVE YOUR CABLES 64
Hide those grotty cables beneath colourful PET.

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Be a Computer Techie

Chris Taylor wants you to consider being a technician in the IT industry.

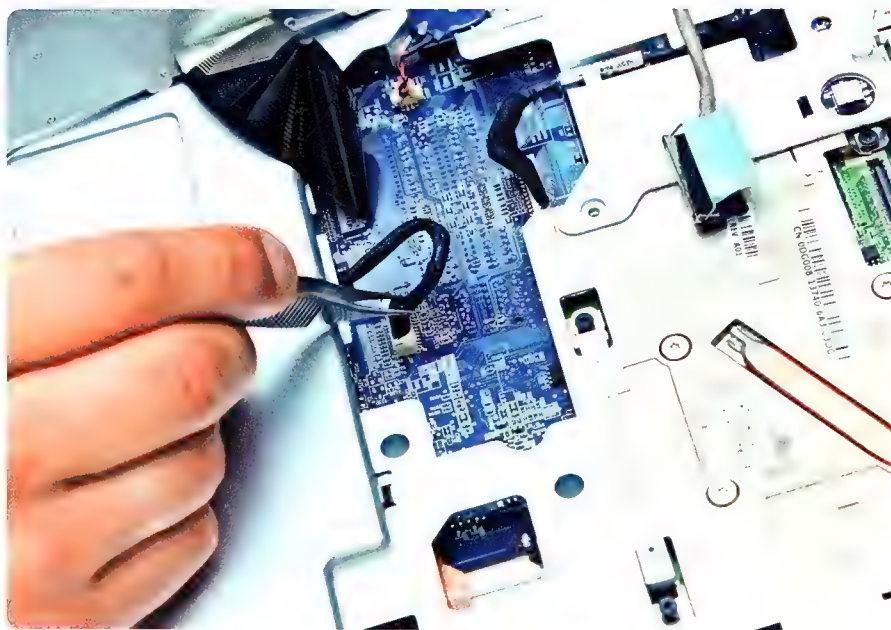
We've all been in the situation of being called up, often at the most inconvenient times, to go and fix mum's, dad's, the neighbour's, the distant friend's computer. How they don't know what they were doing and that it wasn't on purpose or anything, but they were 'freeing up space' and wound up deleting a lot of things and now the computer is acting funny. We've cleaned up after the little shitty nephew who has left trail of adware and spyware but swears, honest to God, cross my heart, that he wasn't looking up free Asian schoolgirl porn. And the pay is, generally, at most, a six pack of mediocre beer or a scrunched up \$20 you feel awkward about accepting from a relative. This is something someone could get paid for.

That someone could be you. If you're a long-time part of our readership, a hands-on sort and have the patience to solve tricky problems, work as a tech is probably within your capabilities and area of interest—after all, you get to fool around with computers all day, even if that means repeatedly going through mundane processes such as installing Windows or correcting some twelve-year-old kid's attempts to 'tweak' his family's Acer desktop to get a few extra frames per second out of Crysis 2.

Tweaking for fun, but mostly profit

In all seriousness, what is work as a technician like and what does it require? Well, that varies. Describing someone as a 'technician' is using about as broad a term as saying, "oh, I work in IT," or "I'm studying engineering." There are computer techs who sit on their arse all day, fielding phone calls from people who've, odds-on, forgotten to check everything is plugged in and switched on. There are computer techs who run their own businesses. They may work for stores or larger organisations that go around, repairing the computers of individuals or companies – the work they do can be basically the for-profit version of the family tech work you do for free or it could be actually kind of important. You can have what is, essentially, a low-paying job with little to no opportunity for advancement or you could, assuming you're in the right place at the right time and have the right skills, find the opportunity to develop a nice career.

Keep in mind that, as with many jobs in which high pay and career advancement are a possibility, the hours can be terrible. If you're working for a large, important company – a bank, say – or for someone that does contract work for such companies, you can be called up at 3AM on Sunday morning to fix a network



problem. You will be expected to sit there, in the cold of a server room, for long, long, long hours working through issues until they're fixed. The work does not necessarily end at 5PM on Friday evening, when you'd rather be starting on your first James Squire of the weekend.

You don't need a qualification to become a tech. Not as such. Even if you do have one, most of the knowledge a tech needs comes from experience with playing, breaking and fixing computers – not from attending lectures and tutorials at TAFE and university. Those core problem solving skills that are necessary as a tech – and more achievable than an encyclopaedic knowledge of every error Windows 7 can throw up – are developed through years of encountering problems on a day-to-day basis. The necessary patience, care and attention to fine details can't be taught, either. Encouraged, yes, and possibly even refined, but they're not skills or qualities derived from textbooks.

If you're the sort who cracks the shifts when fixing minor but common computer errors for people you like, then this line of work really isn't for you. You're being paid not only to take care of people's valuable data and technology, but to deal with the people themselves. Finding out what the problem is requires a great deal of people skills, particularly when the people involved feel they might get in trouble or simply don't understand what they did. You may need a fairly detailed summary of what a user did and find yourself dealing with someone who can't

remember exactly what they were doing – they, er, clicked on that thing and then some other thing and then everything was 'broken'. A computer will land on your desk. What's wrong with it? Oh, it's stuffed up. See you in a couple of days. Whether these people are paying you directly, pay your boss or work down the corridor, you can't crack the sads and tell them you can't work with such vagueness or treat people down like you're of superior intellect, even though you yourself may sometimes be treated like a bit of a servant. You need to be patient and clear and non-intimidating. You need to know when it's the right time to 'educate' a client and when it's best to just fix the problem you've already fixed ten times for the same person. You need to have a sense of timing – if a teacher has been harassing you to fix a few students' network accounts, expect to earn a high-ranking position on their shit list if you walk into their classroom during the morning literacy block, demanding attention. This is true of many workplaces. Think of it this way: if you're a tradesman, you want your electric drill to just work. It's a means to an end. Your goal is to build houses and someone who stops you right in the middle of driving in a nail to ask questions about your drill is, really, a pain in the arse. You've already told the repair guy what the problem is. At the very least, can't he wait until you're on a break? This may be unfair on the repairman – or the computer technician – but it's the way things are. Knowing how to pander to that will do you a lot of good if you're interacting with lots of people for whom

technology is a means to doing a job, not the job itself. If someone can read on your face and through your body language and tone of voice that you're really goddamn frustrated, when all you've been asked to do is show someone where Word is 'hiding' (for the fifth time), then maybe just go into sales, where the support stuff just isn't your problem.

Telling other people what to do

If you're running your own business, communication is even more important – perhaps moreso than your technical skills

nice porterhouse or perhaps even a dozen really nice steaks at once without breaking a sweat, doesn't mean you can drop your day job and open and run a successful restaurant. Lots of people have skills. Not many of these people go on to be self-employed, let alone gainfully self-employed. There are TAFE courses that cover these basic business skills, as well as books that vary significantly in terms of quality and worth.

You need time management and organisational skills. If you're working for a company that, say, services the needs of a few businesses or schools, you might only spend a few hours or maybe a day per week at a particular site. There's doubtlessly a long

Whether you're self-employed or working for someone else, there's so much to being a tech that you won't get from tertiary education – or, at least, needs to exist in you in some form before you attend TAFE or university. That being said, a qualification doesn't hurt and, indeed, may be necessary to get your foot in the door at some larger organisations.

Certificate and Diploma-level qualifications in Information Technology and Network Engineering can be of huge benefit when you're looking for a job – some employers mightn't care, but a piece of paper that shows you studied something, and maybe even did reasonably well at it, at the very least backs up a resume that claims you know how to set up and maintain a network. At very large companies, some employers may even want to see a university-level qualification – a Bachelor's degree, say – although we don't want to give the impression that this is true for the bulk of tech jobs. Depending on where you're seeking work, vendor certificates – the CCNA and MCSE range, the Oracle and VMWare certificates – can be worth your time and investment (some former students advocate buying the literature online and then just paying to sit the exam, rather than paying the exorbitant fees to sit in a classroom and have someone pretty much read the textbook to you). ☺

If someone can read through your body language that you're really goddamn frustrated, then maybe just go into sales

or the technical skills of any employees you have. You also need the skills associated with running a business of any nature – you need to understand the legalities of employing people, the possible implications of things going wrong (i.e. you or an employee accidentally break something at a client's office) and the tax system. Think of it this way: being able to cook a really

list of things, prepared just for you each week, that need to be fixed. Spending the entire day focused on one issue, even if it's the biggest issue, isn't necessarily the best idea – that guy with the computer issue you've been fobbing off the for the past three weeks, maybe he's got the ear of whoever it is that chose your company, as opposed to a competitor, to do the tech work.



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Sleeve Your Cables

Antony Leather shows you how to take neatness and colour coordination to whole new levels.

Routing your cables neatly through your PC can work wonders in improving its appearance. However, if you're prepared to go the extra mile, braiding your cables is the ultimate way of coordinating colour and hiding those multicoloured power cables. It's easy to do, albeit time-consuming, and there's a host of off-the-shelf sleeving and heatshrink material colours that allow you mix and match with the overall colour scheme of your PC. You can even buy pre-sleeved cables, again in a range of colours. In short, there's no excuse for you not to have a unique and great-looking PC. This following guide will help:

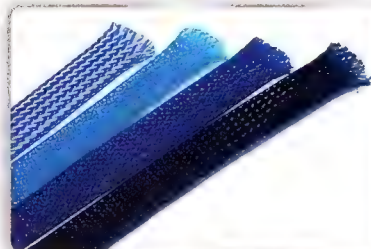
tools you'll need

- Cable Sleeve** – Comes in a range of colours and materials, and sold locally through stores like PCCG (<http://pccasegear.com>) and GamMods (www.gammods.com.au/store). The best sleeve is inevitably the most expensive, but MDPC-X sleeve is quality through-and-through (<http://en.mdpc-x.com/mdpc-sleeve.htm>).
- Heatshrink** – For creating a snug fit at each end of the sleeve, and to hold it in place. Sold at the above stores, and available for purchase at electronics stores like Jaycar (www.jaycar.com.au). Cheap heatshrink is horrible, nasty stuff that barely shrinks at all, so look to pay around \$1 per metre for the pliable 4:1 stuff.
- PSU de-pinning tool** – Sold at the same stores as sleeve, typically these only work with a single type of cable, such as Molex or SATA, and allow easy removal of the plastic connectors for sleeving. Worth investing in if you're sleeving an entire system, or you can ghetto it up for smaller jobs with a small screwdriver to poke in the tabs instead.
- Needle-nose Pliers** – Not essential, but very useful for gripping thin cables securely.
- Cigarette Lighter** – The cheapest and most accessible choice for today's pyromaniacs, this is invaluable for stopping fraying at the ends of sleeving, and can pull double-duty as heatshrink shrinker if you're careful not to let it burn.
- Blow-dryer** – Great at creating an over-all smooth shrink on the heatshrink, this is an optional choice for those after perfection. Will need to be a relatively powerful unit to create enough heat.

1

PICK A COLOUR

Cable sleeve and heatshrink are available in countless different colours, meaning that you can coordinate the colours of your cables to those of the rest of your PC. Bear this in mind before you buy - if you're planning to sleeve all your cables, this can have quite an impact colour-wise. Go the usual pairings for an intricate theme, such as red and black or white and blue.



2

MEASURE: TWICE

To order appropriate lengths, it's certainly worthwhile measuring the length of the cables you're planning on sleeving. It might not look like it, but a 500mm-long 24-pin ATX connector needs 12m of sleeving if you're going to individually sleeve each cable. We always suggest adding an extra couple of centimetres to each measurement you make - you may make a mistake and need to re-do a sleeve, so having extra lengths can come in handy.

PLACE THE ORDER

Sleeving and heatshrink are available in different sizes for different applications. 8mm or 10mm width sleeve is good for SATA cables and most PSU cables, while 12mm should be used on the 24-pin ATX connector cable. Use 3mm sleeving for individual cables and fan power cables. Heatshrink may need to be stretched over the connectors themselves, be it SATA or power connectors, so select a size that's slightly larger than the connector.

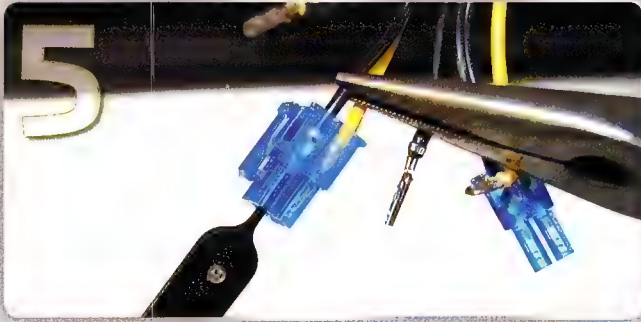


4



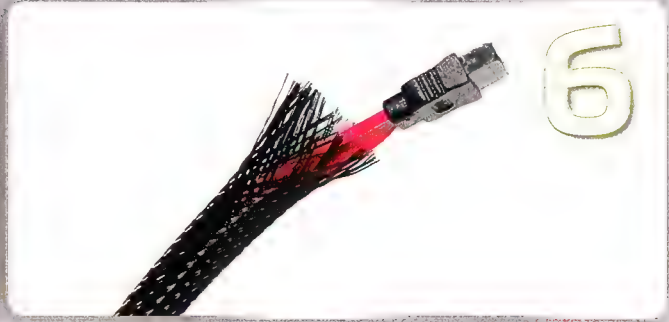
PLAN AHEAD

If you de-pin power cables, such as those on the 24-pin ATX connector, it's extremely important to return them to the correct sockets. Numbering each one according to the sockets is a quick and easy way to avoid disaster. You can use a pin-out diagram to label them correctly (<http://tinyurl.com/abxpinout>). Alternatively, if you're sleeving each cable individually, simply work on one cable at a time. Taking an initial photo can help if you're paranoid.



REMOVE CONNECTORS

In most cases you will need to detach power cables from their connectors to be able to sleeve them. This will certainly be the case with the 24-pin ATX connector. To remove the individual cables from their sockets, you'll need a PSU de-pinning tool. These are special tools that can be inserted into the power connectors, bending the flanges that hold the cables in place, and allowing you to remove them. Be careful not to pull on the cables too hard, as this can result in the wire detaching from the connector at the end, which will then need resoldering. They should remove easily from the connector if properly manipulated.



SLEEVE THE CABLES

With the cables removed from the connector, it's now time to cut your sleeving to length. Hold the length of sleeve against the cable you intend to dress, and run your fingers down the length of both to ensure you have an appropriate amount of sleeve to cover the entire length of the cable. Allow a centimetre or two extra before cutting it, cut it cleanly with sharp scissors, and melt 1 cm of the frayed end of the sleeve with the cigarette lighter to keep the thread from unravelling. Bunch the sleeve up to open the weave and make it easier to manoeuvre, and once completely on, stretch it out to close the weave and block sight of the cable beneath.



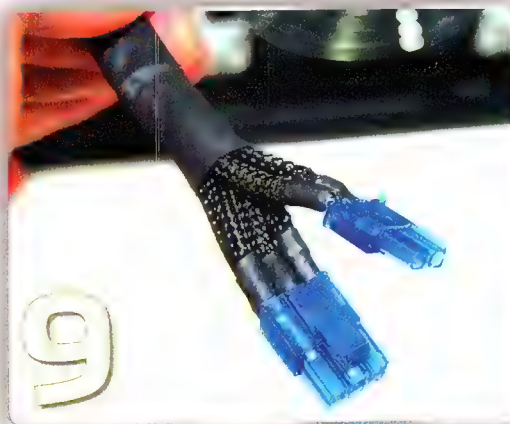
ADD HEATSHRINK

There are two styles here, with the most common being to cut enough heatshrink to hold the cable in place and continue to cover half the plastic connector. This is done by cutting enough heatshrink to cover 2cm of sleeve and the connector, placing it over the cable, attaching the connector, then stretching the heatshrink over the connector. If you prefer the connector free of heatshrink, simply don't cover it. Be careful when covering connectors to ensure you don't cover too much – and block insertion into the appropriate socket.



APPLY HEAT

A standard cigarette lighter is a useful tool for shrinking the heatshrink down to size. With the heatshrink in place over sleeve (and connector), pass it backwards and forwards above the flame, keeping it at least 6cm away from the lighter. Continually rotate the cable so the heat is spread evenly on the heatshrink, taking care not to linger and burn the heatshrink or melt the sleeve. It shouldn't take very long to achieve a snug fit. A particularly hot blow-dryer is a great alternative here, and significantly reduces the danger of burning.



RE-ATTACH CABLES

If you haven't already done so, reattach the power cables to the PSU, making sure to insert them in the correct order. Occasionally, the metal flanges that originally held them in place may need to be bent outwards so that they lock in place when inserted into the connector. If you damage these, replacements can be purchased and then soldered on to the ends of the cables. We'd suggest you be careful.



THE LAZY WAY

In addition to replacement power connectors, which are available in a host of different colours, pre-sleeved cables are also available. These are extension cables that sit between your existing power cables and your hardware, allowing you to hide the existing cables and just show the extensions. They're more expensive than sleeving and heatshrink, but are great if you don't have the time to do the sleeving yourself. BitFenix's Alchemy range of pre-sleeved cables is extensive and very well made. Whichever route you choose to follow, make sure you take photos of the finished job, and display them on <http://forums.atomicmpc.com.au/> for all to see.

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GAMEPLAY

GAMES, GAMING AND GEEKERY COVERED... ATOMIC-STYLE

For those of you out there who just haven't had enough of Skyrim (and really, that's most who have picked it up for more than five minutes), Ashton Mills returns this month with a gigantic look at some of the best mods you can use to revamp the experience, add shiny textures and effects, and extend the life of your game. Playing on a console? Well uh... here's a sticker. That's really all you guys can do. PC FTW!

Then Nathan Lawrence takes a look at what it's like to be an Indie Dev; certainly not a prospect that most take up, but it's an increasingly attractive option. He's got the scoop straight from the Aussie horse's mouth.

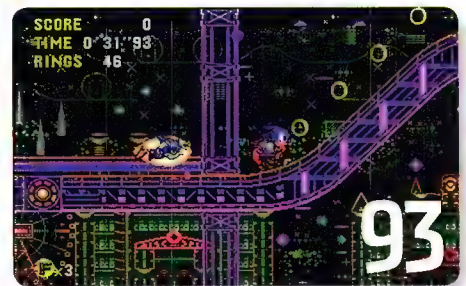
Finally there are a bunch of reviews for very old (Sonic CD over a decade later), old (L.A. Noire once more) and the decidedly newer (Trine 2). Just another month with Atomic!

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SKYRIM MODDING GUIDE

Our master of mods, **Ashton Mills**, finds the best ways to improve, expand, and generally make-more-awesome The Elder Scrolls V: Skyrim.

At the time of writing the official Creation Kit for Skyrim isn't out, yet there are over 5000 mods out for Skyrim, thanks to some ingenuity and clever reverse engineering.

And we've been through all of them – quite literally, during a one month project – to bring you the best of the best for the ultimate Skyrim experience. If you must know, there are about 170 mods covered here. So get comfy!

BEFORE WE BEGIN

Modding Bethesda games always involves a mod manager – these programs help you install, remove, and manage conflicts between mods. It usually takes a little time for mod managers to mature for each game, but fortunately the community can build on previous work from Oblivion and Fallout 3.

At the time of writing there is a new mod manager on the scene: Nexus Mod Manager (NMM). The Nexus family of sites are one the biggest mod resources in the world, and all the mods covered here are hosted on Nexus. The Nexus Mod Manager is still in its infancy, but one of its best functions is the ability to notify you when a mod has been updated.

In terms of features, however, Wrye Bash is the long-standing champion and has already been ported to work with Skyrim – it not only

makes it easy to install and uninstall mods, but it will manage conflicts for you, allow you to modify mods and repackage them, and most importantly of all, makes it easy to change the load order of mods just by dragging them up or down. Its conflict-tracking means it can restore files overwritten by a mod when you uninstall that mod, which makes it perfect to try out texture mods.

If you only plan to use 50 mods or less, you can get away with just using NMM, but as you'll see here it's easy to find yourself running many more than this, and for that Wrye Bash helps keep things simple.

Special thanks go to Jacob Lojewski, the maintainer of Wrye Bash for Skyrim, for helping us out with an update to Wrye Bash and the large number of mods we were testing to create this guide. Let's get started.

INSTALLING THE MODS

Head to www.skyrimnexus.com/content/modmanager to download the Nexus Mod Manager and www.skyrimnexus.com/downloads/file.php?id=1840 to download Wrye Bash. Install either before proceeding.

NEXUS MOD MANAGER

To load a mod into NMM, click on the *Download With Manager* button on Nexus for a given mod (Note: you need to be logged in to see this; accounts are free, and you will be doing a lot of downloading!). You can also click on the *Add mod from file* button in NMM and point it to a downloaded mod archive. Once a mod is in NMM's list, you can double-click on it or hit the *Activates...* button to install it into Skyrim's directory structure.

WRYE BASH

Simply drag a file from Windows Explorer or your browser's Download dialog to the Wrye Bash window. For example, after downloading a mod with NMM so you can be informed when it's updated, you can browse to NMM's mod directory (set in NMM's options) and simply drag the mod across to Wrye Bash. Again if you're going to use a lot of mods we recommend you install, remove, and re-order your mods using Wrye Bash only. The only exceptions are certain UI mods, but these are covered below. We know it's a little convoluted at the moment, but as these tools evolve you'll eventually only need to use one (likely Wrye Bash). Read the manual for all its features, but for now you can check conflicts between mods to help you determine load order using the right-hand pane when two or more mods are enabled.

For texture mods, installing them to Skyrim's directory automatically enables them. For mods that use *esp* files (Bethesda's module format) they will be copied to Skyrim's Data directory, but not automatically enabled. For both NMM and Wrye Bash you'll see a 'Mods' tab – this lists *.esp* files to load in your game. Simply click on a newly installed *.esp* to enable it.

Finally, before you get onto downloading there is one more important step: activate Archive Invalidation, which is fancy wording for telling Skyrim to recognise new files like textures in its directory hierarchy to replace its own ones. NMM makes it easy – simply click on the tool icon in NMM and activate Archive Invalidation. You only have to do this once.

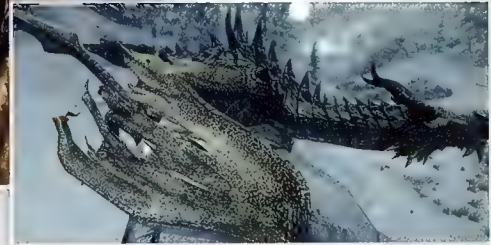
THE ESSENTIALS

Mods are always personal preference but there are three mods we recommend for each and every Skyrim player:

Skyrim Script Extender (SKSE) – skse.
silverlock.org – Extends the functionality of



Yes, even we're blown away by how much better things look - the dragon ain't bad, too!



Skyrim. Many mods already use its features, including SkyUI – the PC centric user interface overhaul. Extract to your Skyrim directory (not Skuyrim\Data, as with most mods).

SkyUI – www.skyrimnexus.com/downloads/file.php?id=3863 – Whaddya know, this is our next recommend mod to install! This gives Skyrim a much-needed UI overhaul, and we can't recommend it enough. Important: Install this through NMM, as Wrye Bash doesn't currently support the integrated install wizard that SkyUI uses.

Skyboost – alexander.sannybuilder.com/?category=other – Skyboost is simply amazing. It patches the Skyrim executable on the fly in memory to replace slow functions with faster assembler versions: kinda like having your engine replaced in your car, while you're driving, at 100KM/hr. It will boost your FPS in CPU-heavy areas by up to 50 per cent. It actually spawned from an SKSE plugin called TESVal (TESV Acceleration Layer) but has since surpassed TESVal in performance. Skyboost has one other benefit: it drew attention for Bethesda that Skyrim hasn't been optimised. At the time of writing, patch 1.4 has just been announced and Bethesda's changelog mentions Skyrim will now be properly optimised. Skyboost *may* no longer be required – check www.atomicmpc.com.au for the online version of this guide which we'll update with the latest news by the time you read this.

Once you've got the above installed, grab a coffee/coke/buzzy drink of choice and settle in for some serious downloading.

THE MODS

Firstly to keep it simple, and as all these mods on are Nexus, each mod will be followed by its Nexus ID. To find and download the mod, simply append the number after the mod name to this URL: skyrimnexus.com/downloads/file.php?id=XXXX. So for example, as above, SkyUI can be found at skyrimnexus.com/downloads/file.php?id=3863.

Secondly, the mods listed here are listed in recommended load order. Texture mods especially can sometimes kick in at cross purposes:

such as a city retexturing mod that also covers armor for guards, whereas a separate mod might focus just on guard armor for all cities. Which one do you want to take priority? When using mods the one loaded last takes effect, so where mods have crossed purposes we've actually inspected the textures and chosen the best load order to use. As a result not only are the following mods sorted within each section, including the 'Also grab' recommendations, but the sections themselves are part of the load order (so for example, loading the mods in Architecture before the mods in Objects).

Wrye Bash allows you to create Markers to organise your mods. The section names here are the ones we used to categorise and sort the mods: use these or create your own.

TEXTURES NPCS AND CREATURES

HIGHLIGHTS

Bellyache's Animals & Creatures

id:3621

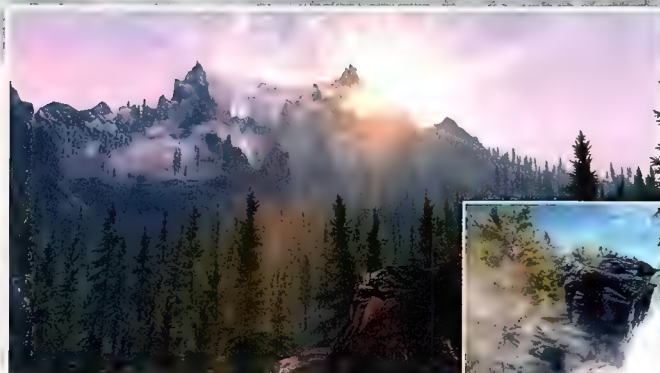
Improved textures for, well, animals and crea-

ENJOYING THE RIDE

If you're even a half-decent gamer, you may be disappointed at the rapid pace that you level in Skyrim even on Hard (an unfortunate and common complaint with all Bethesda games). It's entirely possible to max out your level quite early and end up getting bored because you can fell dragons just by sneering at them.

The solution is a slower leveling mod. As leveling pace is very much a personal thing, we don't recommend any one mod, but we do recommend using at *least one*. Here are some of the options on Nexus. Read the descriptions, as there some disadvantages for some. Once the CK is out, better level scaling mods will become available.

- **Slower Skill Gain** – id:49
- **Slower Levelling** – id:175
- **Level Curve Rebalance** – id:1094
- **Skyrim Relevel** – id:4630



Sun glare and Realistic water textures.



tures. Also fixes normal maps that causes that plastic-looking fur in vanilla Skyrim.

Xenius' Character Enhancement

id:2356

A fantastic visual overhaul for your character and NPCs – smoother skins, better eyes, added facial detail and more.

Better Females By Bella

id:2812

Makes the girls look beautiful without going over the top. Recommend the Less Makeup optional plugin. Also check out Coverwomen (id:3563).

High Definition Vanilla Dragons

id:4408

Greatly improved textures for your primary foe. Grab the 2048 x 4096 textures if you don't want your PC to cry when it meets a dragon (unless you have a 3GB card).

ALSO GRAB:

Better Beast Races – id:944

Better Antronach Textures – id:1936

Eyes Skyrim – id:1430

Realistic hair – id:3397

Straight hair retexure – id:4333

101 Bugs HD – id:4955

TEXTURES LANDSCAPE

HIGHLIGHTS

Enhanced Distant Terrain

id:1598

Makes unloaded cells blend much better in the distance with no performance impact.

Skyrim HD

id:607

Must have. Nay more cannae be said. 'Cept this: If you don't have a 3GB card, grab the Lite pack.

Skyrim Realistic Overhaul

id:5400

We like the result of loading SRO after Skyrim HD. It covers less textures, hence still load Skyrim HD, but these are closer to Skyrim's original feel, so you get the best of both. Also check out Better Landscape Skyrim (id:4863), Serious HD Retexture (id:2146) and Better Landscape Textures (id:679).

Realistic Water Textures

id:711

This pre-eminent water mod improves water textures, adds different flow for rivers and lakes, new rain puddle textures and more. Also worth checking out are Immersive Water (id:3068) and Pure Waters (id:1111).

Better Rocks and Mountains

id:2906

Try it with textures, otherwise grab the No Textures pack (our preference), and install the 2K resolution. This then works with your landscape texture overhaul, and greatly improves the look of rocks and mountains. There are a lot of rock texture mods but we found most over-did it or caused shimmering effects from too much detail thanks to how specularly works in Skyrim.

Snow Ultra Quality

id:1382

Part of Snow and Rocks HD mod, of all the snow mods on Nexus (and there is an avalanche of them [yeah I went there!]) this is the best combination of looking great without

noticeable tiling. If you want a second choice, another one we liked was Alternative Snow (id:6086), but it tiles a little.

ALSO GRAB:

Real Ice – id:5338

Better Distant LOD Waterfalls – id:6161

TEXTURES SKY, TREES & FLORA

HIGHLIGHTS

HLP Night Sky

id:468

Stare in awe at the heavens! A good alternative is Enhanced Night Sky Skyrim (id:85); take your pick.

Vurt's Skyrim Flora Overhaul

id:141

Beautiful trees, grass and more. Also adds much improved distant tree LOD – there is an Enhanced Distant Trees LOD mod (id:3389), but we think Vurt's is better.

Skyrim Sunglare

id:116

It's the little mods that can make the biggest difference. Also check out Realistic Sun Glare (id:680) and Real Sun Sunglare (id:866). Load these after Sun and Clouds textures (see below).

ALSO GRAB:

Sun and Clouds textures – id:2616

Dramatic clouds – id:4910

Replacement ivy – id:1878

Hybrid's Hi-res Plants and Herbs – id:1546

TEXTURES NPC CLOTHES

HIGHLIGHTS

Clothes Improvement

id:113

Not the best mod but it covers the widest range, hence loading before the next two mods.



Clothes can be vastly improved.

DDSOPT

While there are some brilliant and talented texture artists out there, there also many beginner modders who don't always save their textures in the right format. DDSOpt is a tool that analyses textures and properly compresses them in the optimal format which, depending on the mod, can save hundreds of MBs. To understand why this is important see the *Matters of memory* boxout and, after you've installed all your mods and backed up your Data\Texture directory, give it a go and see if it helps. It can take a while, but quad- and six-core CPUs will benefit greatly.

DDSOpt can be downloaded from skyrimnexus.com/downloads/file.php?id=5755

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ADVENTURER



PC-TU200A

- M/B type: Mini DTX, Mini ITX
- Bays: 5.25" x 1, 3.5" x 4 (Hot swap), 2.5" x 2 (use 3.5" x 1)
- Dim.: 220 x 320 x 360 mm
- Colour: silver / black

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** A WINDOW TO THE SOUL **

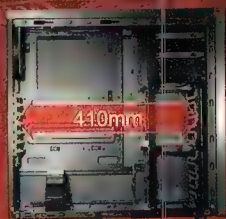
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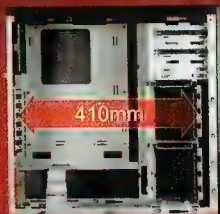


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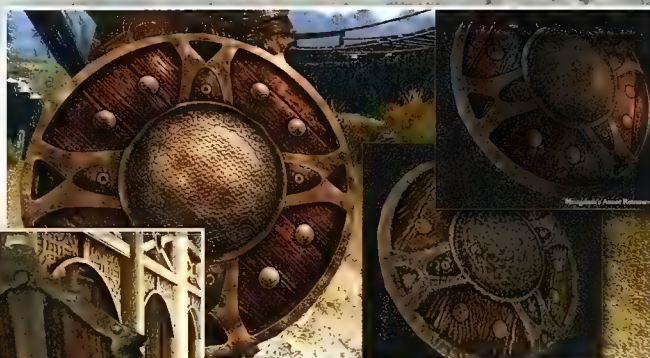
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Improved NPC Clothing

id:2674

Download the 'More Dirt' version and the Expansion Pack. Now we're cookin'!

Kobyashi's 2X Clothes

id:5603

And the icing on the cake is Kobyashi's excellent work. Together these three mods revamp Skyrim's populace.

ALSO GRAB:

Yosolda Outfit HiRes – id:2051

TEXTURES ARMOR

HIGHLIGHTS

High Resolution Armors

id:2009

Gently improves all armors in the game. Also check out Weapons and Armor Changes (id:3793), and use one after the other depending on your preference.

HQ Shields

id:225

Vastly improved shields for first and third person. No more looking at Xbox graphics.

Hvgerelmirs Armor Retexture

id:3261

Beautifully detailed hand-retextures. Covers limited range, hence load after the above mods.

Bucklers

id:5315

Wonder where the bucklers in the game have gone? Right here!

ALSO GRAB:

AEterna Circlets – id:1994

New Stones for Circlets – id:3480

HD Reflections Armor – id:1197

Closer Quivers – id:5711

TEXTURES WEAPONS

HIGHLIGHTS

Weapons of the Third Era

id:3871

Adds a stunning 50 new weapons, many of them craftable, based on Morrowind and Oblivion lore. Adds tons of diversity to NPC encounters as well.

Skyrim Weapon Retex Project

id:1754

Beautiful and detailed hand-made retextured weapons. Still in development, but can be used now and updated later.

JaySuS Swords

id:1002

Adds dozens of highly-detailed and original weapons to the game. Cut your foes in style!

ALSO GRAB:

Beautiful Skyrim Legendary Weapons – id:1377

Proper length arrows – id:5164

TEXTURES ARCHITECTURE

HIGHLIGHTS

HQ Towns and Villages

id:3467

Much improved town and building textures. You can also grab Spamheinz's HD Houses (id:994) as it covers some different elements, but load it before HQ Towns and Villages.

Hi-Res Legible Road Signs

id:436

Greatly improves the low-res road-signs across Skyrim.

Intricate Spider Webs

id:2532

Not arachnophobic? You will be...

ALSO GRAB:

Less Blurry Ruins Retex – id:2757

HD Urns – id:3483

HQ College of Winterhold – id:2552

Chris2012's Whiterun Texture Pack – id:114

Not so stretchy Windhelm – id:544

Nicer Snowflakes – id:296

Improved Torch Textures – id:534

Dragon Inscriptions Smooth – id:2803

HD Banners Unique – id:3067

Re-Defined Dungeons – id:3147

Bumpy Inn and Shop Signs – id:4470

TEXTURES OBJECTS

HIGHLIGHTS

High resolution books

id:1628

Greatly improves books as objects as well as



Third Era Weapons = awesome.

HEALTH BARS ARE FOR... KHAJITT PUPS

We recommend using the Immersive HUD mod because it's fab, but more than this – and best of all – is the ability to disable health bars for enemies. Why for, Ashton, you say such a crazy thing? I mean, you like knowing how close to death an enemy is right? But that's entirely the point. When you disable the health bars you really don't know if you're whooping an enemy's ass or he's shrugging off your attacks and you're about to bite it. That uncertainty, that fighting like every hit counts because in truth *it should*, adds a huge depth to the game. Try it, and thank me later.

paper, however load HQ Paper (next) for a better result.

HQ Paper

id:5988

You'd be surprised what a difference a quality paper mod makes!

Xaphods prettier clutter

id:3600

Ze clutter, it is everywhere! So making it look good adds to immersion.

Tobes high-res textures

id:1123

Tobes covers some clutter and furniture, be sure to load it after Xaphods.

Skyrim Re-designed

id:2550

Brilliantly re-designed textures of various elements in Skyrim. Pick which components you want, or use them all.

ALSO GRAB:

Not really HD rings – id:2953

HD Chest – id:5481

HD Furniture and barrels – id:238

HD Food and clutter – id:280

HQ Food Ingredients – id:1192

SLOD Potions and Poisons – id:4259

SLOD Wine Cellar – id:4260

Better gold – id:362

HD Sacks – id:2836

HD Baskets – id:2782



Realistic lighting and Spell impacts.

Ingots pack – id:3605

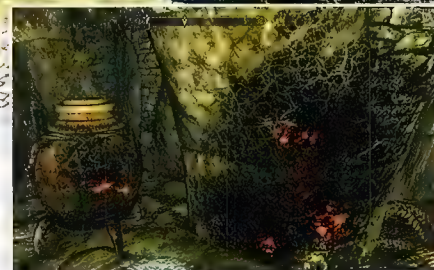
Super Realistic Ore textures – id:3794

Hi-Res pelts – id:3103

Falmer Clutter Texture mod – id:4351

Nordic Ruins objects retexture – id:4697

Higher-poly Skyrim – id:2054



Skooma Mod – id:5902

Shadow Warrior fix – id:5321

Projectile Soultrap – id:5717

TEXTURES

MAGIC & SPECIAL EFFECTS

Highlights

Realistic Lighting without post-processing

id:4323

Changes colour and tone without using an injector. While recommended, this is still one of personal preference. Give it a go and see if you like it.

Deadly Spell Impacts

id:2947

Half the fun of magic is seeing things go *boom* or, if you miss, at least a mean-looking hole in the wall.

Enhanced Blood Textures

id:60

Let's face it, you want the weight of your weapon to really leave a mess. That's how enemies know you're serious. Recommend the Blurry Screen Blood addon.

ALSO GRAB:

Blood on Weapons longer – id:223

Realistic Smoke and Embers – id:836

Better Smoke Textures – id:3909

Enchantment Effect Replacer – id:1345

Scaling Elemental Runes – id:3903

HD Fire Effects + Embers – id:2692

Finer Dust – id:26

Conjuration & Summoning Fixes – id:3352

Conjuration Duration Scaling – id:3953

Night Eye Illusion Spell – id:3507

Increase Torch Range – id:5188

Additional Skill Books – id:5575

GAMEPLAY

CRAFTING

HIGHLIGHTS

Weapons & Armor fixes

id:4719

Unfortunately Bethesda left a lot of bugs with armor and weapons stats, balance, materials and even models in some cases. This mod is essential.

Smithing Perks Overhaul

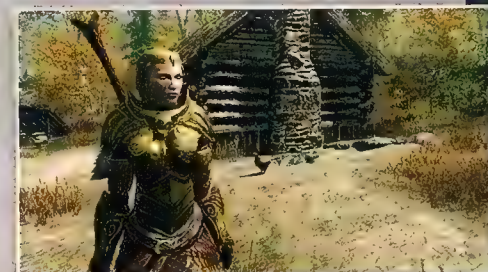
id:6047

Works with Weapons & Armor fixes to allow you to properly upgrade weapons and armor that should have been upgradeable but weren't due to (again) bugs. Also essential!

Lost Art of the Blacksmith

id:1020

Adds dozens of missing recipes (*another oversight from Bethesda*) for upgrading weapons and armor at a forge. Also a must have.



Jewelcraft adds bling.



HQ Paper.



Deadly Dragons make the monsters meaner.

Arrowsmith

id:1178

You're a bow master and you can't make your own arrows? Blasphemy! Fix it thusly.

Jewelcraft

id:1042

Not essential, but if you like jewellery and making your own, this is the mod for you.

ALSO GRAB:

Cooking Recipes Pack – id:1468

Legendary Smithing Upgrades – id:1690

Babbettes Feast Rebalanced – id:5816

GAMEPLAY

SCALING & BALANCE

HIGHLIGHTS

PISE - Improved Skyrim Experience

id:1269

Makes game harder by increasing some spawns, improving AI, boost enemy levels and much more. The only general balance and difficulty mod to have.

Deadly Dragons

id:3829

Finding bears harder to kill than Dragons? Common complaint. Install this, fear Dragons.

Faster Arrows

id:1009

Along with .ini tweaks from our Skyrim Tweak Guide for range, this makes archery *feel* like archery.

Skyrim Timers

id:3084

Allows you to tweak a range of settings from corpse duration to the progression of time. Recommend: 7 day respawn, 7 day deadbody timer, 30 day deadbody remover, timescale 10 (especially the last one, makes days last longer).

Duke Patrick's Combat Tweaks

id:3646

Make combat more visceral and challenging. An alternative is Deadly Combat (id:5485). Recommend to use one or the other.

ALSO GRAB:

No Auto Aim (note: included in Duke's Combat Tweaks) – id:3460

Deadly Traps & Sickly Diseases – id:2905

No Perk Prerequisites – id:1943

Reduced Force & Ragdoll – id:601

Potions heal over time – id:

Cutthroat Merchants – id:2762

Subliminal Traps + Tripwire – id:2653

Polished Pickpocket Perks – id:3289

Pickpocket Fixed – id:858

Longer Sprinting – id:167

Faster Horses Sprint – id:934

Less Annoying Items – id:4949

Brew a Better Potion – id:5509

Better Shouting Through Speech – id:5452

Races and Doomstones Rebalanced – id:4728

USER INTERFACE

HIGHLIGHTS

Immersive HUD

id:3222

Brilliant mod that hides various UI elements for more immersion. Highly configurable, allowing for some features to appear as needed and dissolve away again. Install via NMM to take advantage of the configuration wizard.

Time On Loading

id:98

Shows you just how late in the morning you've been playing till. Also can remove the spoiler text and images during loading. Install this via NMM rather than Wrye Bash for now, then follow the

Readme instructions to edit its settings.

Fertigo Pro Font

id:95

Much improved and more aesthetic font for the game. Also see Tara and Magic Cards (the font from Morrowind) at same page, Narkism (id:2947), and Fhaarkas Font Replacement (id:479).

English Strings

id:5351

Wassat govnor? Don't like them American spellings? This here mod alters all Americanisms to the mother tongue. Also renames 'Dwarven' to 'Dwemer' as per previous Elder Scrolls games. Seems Beth's writers forgot some of its own cannon.

ALSO GRAB:

High Quality 3D MAP – id:4817

Hectrol Skyrim Logo – id:154

Categorised Favourites Menu – id:4862

SOUNDS

Highlights

Immersive Skyrim Thunder

id:1702

Because *thunder* should always be *awesome*. And scary.

Improved Combat Sounds

id:5289

Another small mod with big impact. Changes the weapon swings and impact to have more oomph!

ALSO GRAB:

HQ XWM Main Theme – id:1509

HQ Quality Default Ambience – id:4336

Catacomb Ambience – id:4636

Dungeon Ambience – id:4386

Potion Sound Fix – id:4218

Throw Voice Fix – id:4369

Sounds of Nature – Fire – id:4278

Sounds of Nature – Water – id:4226



Sky UI.

WATCH OUT FOR: SOUNDS OF SKYRIM

A lot of the early mods have been texture replacers (especially while we wait for the CK to come out), but as everyone knows sound is integral to an immersive, awesome experience. Skyrim is already pretty sweet on this account, but once you hear Sounds of Skyrim, you'll wet your furry breeches. It's currently still in development, but you can find previews on YouTube here:

- Sounds of Skyrim - Dungeons - www.youtube.com/watch?v=yAmYNTJDCsk
- Sounds of Skyrim - The Wilds - www.youtube.com/watch?v=5fFZVF5iL18
- Sounds of Skyrim - Civilisation - www.youtube.com/watch?v=p8H_XmMYN-s



LAST BUT NOT LEAST INJECTORS

Where do we begin? First a quick refresh: injector mods aren't technically 'mods' per se, and they're certainly not limited to Skyrim. They work by adding a dummy **d3d9.dll** that's used to hook in directly to the rendering pipeline for whatever DirectX 9 game you copy the injector to. This allows for levels of shader-based manipulation applied after all post-processing, literally 'injecting' another layer of effects.

And it has tremendous advantages. The most popular injector you've likely already heard of is FXAA (Fast approximated Anti-Aliasing). While initially it was designed to provide fast, low-overhead AA it's since been expanded by other programmers to add sharpening, toning, bloom, vignette and a lot more. And because the variables controlling these functions are easily editable in a text file, lots of Skyrim users have tweaked the settings and uploaded their version of the injector as a mod. Some of them... are questionable. Others are superb. It's hard to recommend just one since everyone has their own preference, never-the-less we'll provide some links to check out.

But if FXAA has a fault it's that its AA method can create a blurry image (though this can be largely offset by sharpening functions). So an alternative that's rapidly gaining popularity is SMAA (Sub-pixel Morphological Anti-Aliasing). SMAA's AA is considerably better than FXAA and is even better quality than high-level driver-based AA for a fraction of the performance cost. The current SMAA injector however doesn't include any other functions such as sharpening, toning and so on.

Finally another popular choice is ENB Series. ENB is able to improve visuals by adding better lighting, shadows, bloom, toning and colours, and even its own SSAO implementation that looks better than Nvidia's. However, ENB Series is quite demanding on both on GPU power and video memory. It's certainly recommended.

Since all of these injectors use the **d3d9.dll** method, you can only technically run one at a time. The exception is ENB Series, which has the ability to daisy-chain alongside an extra injector. For this reason, the most popular injector mods on Nexus are usually ENB + FXAA. Between the two everything you could want to tweak is covered, and the difference is impressive. Search Nexus for 'ENB', 'FXAA', 'SMAA' and 'Injector' to find plenty of these mods to try. However as a starting point, we can recommend the following:

FXAA ONLY

FXAA for Realistic Lighting - id:4749
Subtle Colouring and Sharpen - id:217
Natural Custom Settings - id:2551

ENB ONLY

Gionight's ENB config - id:5516
Confident ENB - id:5253
Cinematic Lighting ENB - id:4142

ENB + FXAA

PPHybrid - id:2662
Skyrim Enhanced Shaders - id:822
Realistic Skyrim HD - id:4463

A note on SMAA: as SMAA is easy to install and focuses only on AA, there are few SMAA mods on Nexus. However, using the tome of knowledge on these pages, if you're trying to free up video memory or gain a few FPS but still want excellent AA and improved colour correction, a good combination you can try is the **Realistic Lighting Without Post Processing** (id:4323), one of the most popular mods on Nexus, combined with SMAA. As RLWPP is an .esp mod, not an injector, you can run it with SMAA as your injector for lightweight and fantastic visuals.

Don't forget though that ENB can also be used with SMAA as it can with FXAA as well. Enjoy your shiny Skyrim experience.

A MATTER OF MEMORY

Skyrim is, as you'd expect, more demanding than previous Bethesda games, and despite graphics cards with 1.5GB on-board being standard these days, it's quite easy to max this out. A number of factors contribute to video memory usage, but the key ones are:

- Resolution
- Anti-Aliasing
- Transparency Anti-Aliasing
- Triple Buffering
- SSAO (Screen Space Ambient Occlusion)
- Textures
- Some injectors (like ENB Series)

Why is this important? Once you hit the limit of your card's VMEM, your FPS will drop through the floor as textures get streamed from system memory. Users with 1GB cards may already be close to the limit depending on the resolution and AA levels being used, even before adding texture mods.

By way of example on our GTX 580 test bed with 1.5GB using the recommended mods listed in this guide, we had to use the lower resolution versions of a number of graphics mods in order to stay below the 1.5GB limit. So as you add texture mods, keep an eye on your video memory usage, especially if you start experiencing stuttering. Keep in mind also that as AA can be very memory intensive you can disable all in-game and driver-based AA, as well as transparency AA, and instead use an FXAA or SMAA injector. This way you can maintain excellent AA while recovering a couple hundred meg, stay under your VRAM limit, and use more texture mods as a result.



The trials and triumphs of indie game development

Upcoming AAA titles are a dime a dozen, nowadays; but it's the indie games that are capturing the hearts and minds of gamers around the world. **Nathan Lawrence** takes a look at what it takes to forge a successful indie title.

It's all too easy to rattle off a shortlist of big titles of 2011 that caught the attention of PC gamers around the gaming globe. *Battlefield 3*. *The Witcher 2: Assassin of Kings*. *Shogun 2: Total War*. *Deus Ex: Human Revolution*. *The Elder Scrolls V: Skyrim*. But then, some of the positively haunting titles of 2011 aren't from developers who have been backed by publishers whose coffers are filled to levels that would make Scrooge McDuck's money bank

look like a kiddies pool.

While the aforementioned AAA titles are reputable in their own respective ways, the narrator of *Bastion* (Logan Cunningham) has replaced James Earl Jones as the guy I want to do my voicemail. *Frozen Synapse* rekindled a love of turn-based games I feared lost with *Monopoly*, and *Trine 2* reminded me that a beautiful game world doesn't have to equate to ultra-realistic graphics. Hell, even the technically

flawed *Breach* and *Red Orchestra 2* treaded some new ground for increasingly samey first-person shooters.

It's amazing that we're becoming accustomed to looking to the vibrant indie world for novelty and genre progression. Originality and evolution, it seems, are not synonymous with big budgets. By the time I finished an engrossing hour-long chat with indie developer Brawsome about their upcoming title, *MacGuffin's Curse*, it was even clearer what indie games have to offer to gamers and prospective developers, alike.

Becoming Brawsome

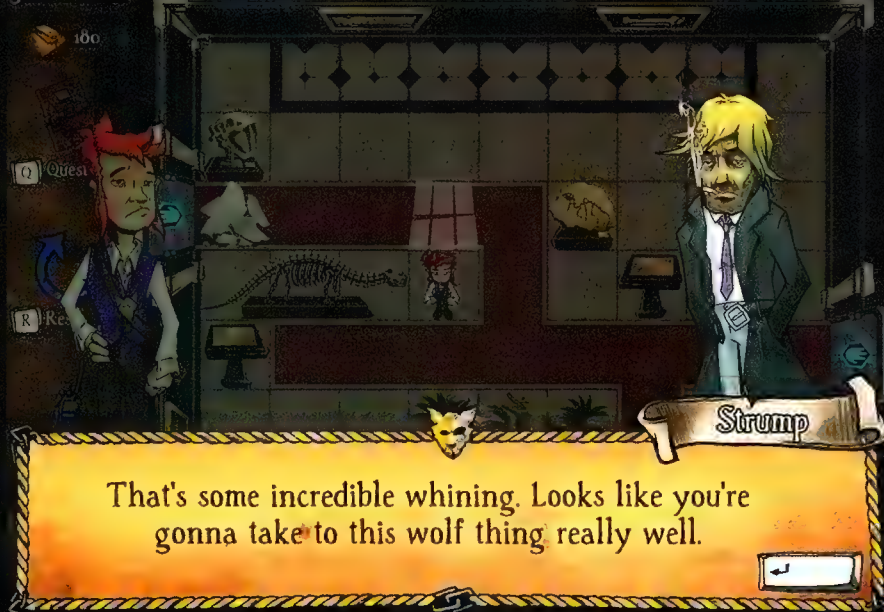
Brawsome is an independent Australian developer that is comprised of two men and has two games under its belt. Andrew Goulding is the director of Brawsome and something of a jack-of-all-trades when it comes to games development. Ben Kosima is a games journalist turned developer who originally started as a contractor, and now specialises in the writing side of things: characters, dialogue and lavish descriptions for inanimate in-game objects.

The Brawsome games are *Jolly Rover*—a comedy swashbuckler adventure on the high seas—and the soon-to-be-released comedy puzzler *MacGuffin's Curse*. What became clear early on in my interview with Andrew and Ben was the fascinating process and enticing passion the duo had for forging indie titles.

Recession as inspiration

Originally, the pair was working on a "game set in a 1920s circus in Middle America" that Andrew

3% COMPLETE



Pixel Panic

Ben was relieved to be working on a game that didn't have pixel art at its core.

"On a personal level, I didn't want the game looking like pixel art. I mean, it's a nice style when done right, but it's just been done so much—especially if your game is an indie game—it seems to be the thing to do. It's something that we'd like to get away from and do something that doesn't look visually retro because that has been done to death."

had successfully pitched to a casual games publisher. Alas, once development began, the global financial crisis hit, development eventually ground to a halt and the publisher retained the rights to the game. Andrew expanded on the unfortunate ordeal.

"So we started working on that game for a while and it was when the industry sort of started going down the toilet, the dollar started rising and the project got too expensive very quickly. And [the publisher] strung me along for a while before sort of terminating it due to 'business reasons'. We were in limbo for a while. I went and did contracts. I worked at the AIE as a programming teacher and Ben worked at the postal service for a while."

It was clear that the Brawsome duo was in need of a new idea.

A new hope

The pitch for MacGuffin's Curse is simple enough: players take on the role of Lucas MacGuffin, a magician turned thief, and switch between human and werewolf forms to solve a variety of puzzles that rely on each form's unique abilities. According to Ben, the simplicity of the pitch combined with a unique idea was

an important part of honing a core idea into a saleable product.

"It's sort of been floating about in my head for quite a while—an idea to do a game with a werewolf—because the only werewolf game that I can think of that's been done is Altered Beast, and that's pretty crap. So I thought it was about time to try making one that wasn't terrible. Originally, the transformation player's would've been between three different forms, based on the time of day: one in the morning, one in noon and one at night. But that got immensely complicated, even in just pitching an idea, so that got cut down to two transformations. I think it was much better for it, anyway."

The bottom line

Out of all of the discussion I've had with developers, publishers and other games journalists, one thing is abundantly clear: there really isn't a shortage of good game ideas out there. The challenge, though, is converting an idea into a pitch that benefactors are willing to fund. Initially, Andrew sought funding at an international games event.

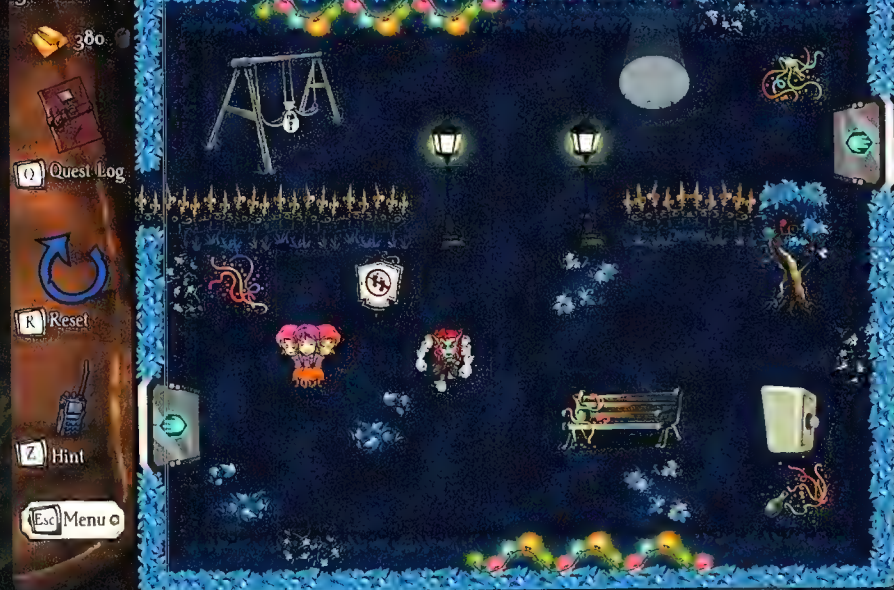
"I was going to the Penny Arcade Expo (PAX) and marketing Jolly Rover at the time, because Jolly Rover had just released, and we cobbled together a quick pitch for MacGuffin's Curse. I took it around there and I talked to a lot of people about it and didn't quite get any traction. We got a lot of interested, 'If you could develop this title, we might be interested in publishing it then.'"

This wasn't to be the first hurdle when seeking publisher funding for MacGuffin's Curse.

Publishers love (their) games

The next logical step for Brawsome was to pitch to a publisher it had dealt with in the past. While the generic PAX replies from foreign publishers

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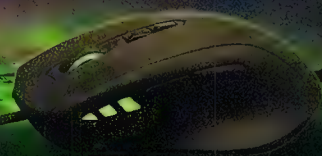


atomic



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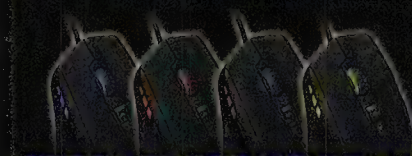
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may have been disheartening, they weren't as confusing as what Brawsome heard from a familiar publisher. Andrew told the tale.

"The publisher was trying to get us to do something similar, but they had a really bad way of explaining what they wanted, and they got all manner of experts that weren't actually experts: they were just trying to throw more people at the game to see if it would fix 'the problem'. It was a real breakdown in communication, and the game was changing to something totally different than what we initially pitched to them, and they kept on saying, 'Don't make it like this game, but actually make it like this game... but don't make it look like that game!' So it's a way of the publisher saying, 'You still have control, but do it this way.' If the game came out, it would have Brawsome's name on it, but it wouldn't be a Brawsome game."

Thankfully, some home-grown benefactors believed in the potential of MacGuffin's Curse.

Cinema loves games

At the end of the day, it was two Australian film

funding bodies that helped to get MacGuffin's Curse off the ground, as Andrew explained.

"We contracted someone to do some art and eventually we had something that looked like a decent pitch, and we pitched that to Film Victoria, and got the funding for it to move on with developing MacGuffin's Curse. After MacGuffin's Curse was basically done, we pitched it to Screen Australia and got some more funding to keep working on it, essentially. If you get funding with Film Victoria or Screen Australia, you really do get to make exactly what you want. And they won't come in and mess it up. Film Victoria is really good. You go, 'This is the milestone, here it is,' and they say, 'That looks good, keep going.' They're not going to go, 'Oh, we don't like the idea anymore, so stop.'"

You've got the look

The visual style of any game is important to establish from the outset, given how it's the primary point of reference for people referring to a specific title. And unless you're the likes of Gearbox, who have the bucks and the backing to change your visual aesthetic during development (a la, *Borderlands*), it's best to lock that down as soon as possible. Brawsome used two different contracted artists to create their unique look for MacGuffin's Curse. Andrew expanded on the history of the art design for the game.

"We started with a different artist, who I'd worked with before on a game, and he gave us the first Lucas MacGuffin and werewolf poses. Our style guide was a cross between *Animal Crossing* meets *Day of the Tentacle*. And we thought that looked really great, but then when we got the funding, he wasn't available anymore. Matt Martin [the second artist] had actually done some work on *Jolly Rover*, and, right from the start, he had a very strong style and a very strong presence on the project. After a while we kind of

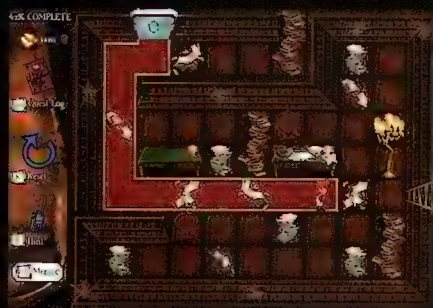
went with what he provided to us. We also took his first draft on a lot of things, because he was giving us something that we didn't expect, but we thought, we'll roll with this because it's not something that we've seen before."

The cake is a lie

MacGuffin's Curse is poised to be exclusively released on Steam. Big deal, right? Many other indie titles have done that before. What you wouldn't know is that *Jolly Rover* has around a dozen distributors, including the almighty Valve-owned digital-distributing platform, Steam. But *Jolly Rover* was only added to Steam's roster after the game was completed.

With MacGuffin's Curse, Brawsome wanted to lock in Steam distribution prior to completing the game, but that required some shuffling in their production schedule and the use of what Andrew called "the dreaded vertical slice." Ben defined the ominous phrase in greater detail.

"A vertical slice is when a publisher says to you, 'Just give us the first level of the final game.' Now, you may not immediately see what the problem is with this, but a game isn't just done bit by bit: it all comes together gradually. So asking for final polish on the user interface and the sound and the art and all the animations is just terrifying. It's like saying, 'Oh, just bake one slice of a cake.' It



Gaming assumptions

Philosophy asks us to question the familiar, so it was interesting when my conversation with Andrew and Ben turned to the core elements of a game. Ben started with, "I think some things are just ingrained. Well, you've gotta have boss battles." They also got rid of title screens. Ben again, "When you boot up MacGuffin's Curse, it goes straight to the profile select [screen]. We don't have a title screen because we figure, you're going to know what game you're booting up. So that's why there's the Browsome logo and that's it; but it's pretty quick. It's not like an animation or anything like that." Andrew added to the list of gaming assumptions that MacGuffin's Curse doesn't adhere to. "We got rid of the end of the game. We expect people to continue playing after the game ends. So you see a credit sequence and then it's like, 'Ah well, just keep going; keep playing.'"

put our whole schedule out of whack."

Andrew went on to emphasise how much it threw the production schedule, but also why it was an important step. "We normally block out all the levels, and then we start off with placeholder dialogue, and then the final art would come in gradually, but this threw our whole schedule out. The big advantage of that was we got to sign up with Steam early on. So only three or four months after we started working on the game, we'd signed Steam up as a distributor, and that was a huge deal for us."

Contending with AAA titles

Indie titles might not have the budget to fund first-in-class sound design, lifelike visuals or Hollywood voice actors keen on dabbling in the entertainment medium that's overshadowing theirs, but there is one simple area where they can contend: writing. To the Moon proved that indie games could be dramatically compelling, while the guys at Browsome scored the Best Game Writing award at Australia's Freeplay Independent Games Festival in 2011. Ben was quick to emphasise his belief in the importance of humour in indie titles.

"I think a lot of indie games take themselves far too seriously. It's like, guys, you're making a game. Lighten up."

Andrew expanded on just how important the writing component is in an indie title.

"I think writing is the one area where we can really compete at the same level as any other game, because I can think we can have as good as writing as any game: AAA title or indie title. It's up to us to do that. I mean, we can't maybe compete on physics or length or graphics or even audio, but writing, that's where I think we can be right up there with everyone else."

Slaughter your darlings

As any creative type out there would know, it's difficult to emotionally detach from creative works. But turning something creative into something saleable tends to mean that certain facets of a creation must be left on the cutting room floor; sometimes the most beloved ones. Sometimes, though, these cuts are necessary to retain the core idea of a game. Andrew talked more about some features that didn't make the cut in MacGuffin's Curse. "Originally we had health and we had enemies and we had these big grand boss battles where Lucas could die multiple times."

Ben justified why they didn't make the cut. "And we're looking at it, and it's like, this isn't our game. You're playing in these casual puzzles and you're thinking, 'How do I solve this level?' And then, all of a sudden, there's music and then boss fight! Oh, wait, I've been killed?"

Andrew expanded on how quickly Browsome went from having boss battles to losing them completely. "This is something that we decided over a period of two days. As I was implementing the boss battles, I was thinking, 'This feels like I'm doing a different game here.' And I called Ben up and I said, 'It's just not working, Ben. How are we gonna make this work? Is this something that we need?' How important is this to put a bullet point on our game saying, 'boss battles'?"

Monkey Island clones

Given the style and setting of Jolly Rover, many a gamer/reviewer compared the title to the popular Monkey Island series. While this is by no means a bad point of comparison, Andrew lamented over the comparison when I asked about a possible George Lucas link within the protagonist's name, Lucas MacGuffin. "I actually tried to move a bit away from anything LucasArts with MacGuffin's Curse because Jolly Rover was compared to Monkey Island, and many people instantly hated Jolly Rover because they saw it as a Monkey Island clone. So I thought, we're not going to be linked to anything this time."

MacGuffin's Curse launches on the 12th of April exclusively on Steam. Now that you've heard Browsome's indie story, it's well worth considering supporting them by purchasing their game that boasts around eight hours of gameplay with plenty of comedy, interesting characters and "ball-breaking puzzles" towards the end of the game.



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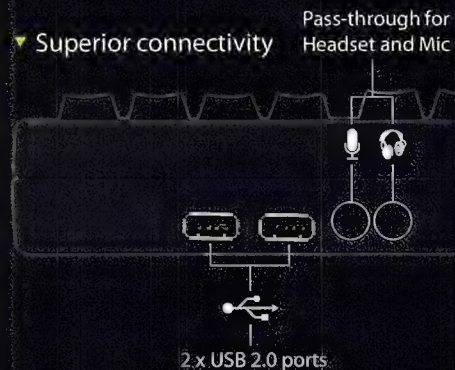
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Sonic CD 2011

Pretty much exactly what you remember.

It was 1993 when everyone's favourite blue hedgehog made it to compact disc, but it wasn't until 1996 that his foray into optical media launched him onto the personal computer. Regardless of the platform he appeared on, Sonic was renowned for speed – and skill. I sunk countless hours into this title as a kid, perfecting my runs through the various levels, and when the news reached us of a remake I leapt at the opportunity to rediscover my blue pal.

Sonic CD 2011 features everything the original release did – quite literally, as the only changes are cosmetic: it now runs in 16:9 widescreen, with updated textures to match; it's got a bunch of achievements for completing various tasks; and it's available on every modern system under the sun. Seriously. Whether you've got a PC, Xbox 360, PS3, Android phone, Windows Phone 7, er, phone, or an iDevice of any description, Sonic CD 2011 is available to purchase for just under five bucks. So what do you get for the asking price?

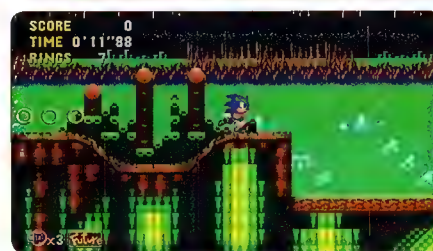
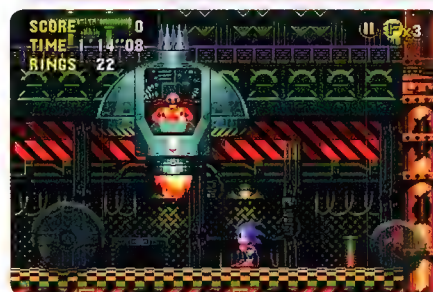
In true style of platformers in the nineties, Sonic CD begins with a short video (online at <https://www.youtube.com/watch?v=JPC8W672mXc>) introducing the character – omitting origins or any of those back-story things that modern games like to include – and dumps you straight into the first of seven 'zones'. Each zone has a different theme, from the starting tropical jungle

to golden racetracks in the sky, and more inbetween. Each zone features three chapters, and each chapter takes roughly five minutes to complete – once you know the layout. Needless to say, we managed to complete Sonic CD 2011 in just under four hours, owing to many deaths and suffocation-induced panic in the underwater chapters.

The title's charm has stayed on and passes the test of time relatively gracefully, though many times it can feel as if the game has 'cheated' due to irritating enemy placement which would normally prove to be no problem – except that at the haphazard speeds Sonic is wont to travel at, you really have no time to see them coming. Even with the additional real estate granted by the wider viewpoint there's no good way to be prepared for what's up ahead.

The slightly endearing time travel mechanic remains and is still never explained; by activating signposts marked 'Past' or 'Future', and travelling at speed for a sufficient time, Sonic is able to leap through time between the Past, Present and Future. Each of these is visually distinct, though based on the same basic level design, and chapters can begin in any of the three choices. The usefulness of time travel really only presents itself when travelling to the Past, destroying Dr Robotnik's evil robot-making machine (the reason for fighting him is never explained, HE'S JUST BAD OKAY), and then making it into the Future to see that all the enemies have been destroyed. And that there are cute bunnies jumping around. Aww.

There are other mechanics that still feel weird as hell, such as finishing chapters with over 50 rings to unlock a bonus stage in pseudo 3D that involves running through a maze and destroying UFOs for extra time and coins. It's still awfully hard to control Sonic in these parts, and just as confusing.



Speaking of controls, well, they're as tight as ever. And the graphics, while updated to not look horrible on a high-resolution screen, manage to look decent without being spectacular. The soundtrack is the same, though there's a toggle to flip over into Japanese mode, and once the main campaign is completed there's an extra character to unlock (that annoyingly can't unlock achievements, as we frustratingly found out). We think it's worth the cash for nostalgia's sake, but is it worth the purchase for those who have never played Sonic CD?

Probably not. **JR**

XBLA; Steam; PSN; Android; WP7; iOS

Developer Sonic Team
Publisher Sega
Website <http://www.sega-australia.com/games/sonic-cd-2011/>

Gameplay
It's Sonic, it's confusing, it's short.

50

Graphics
Has an endearing pastel quality.

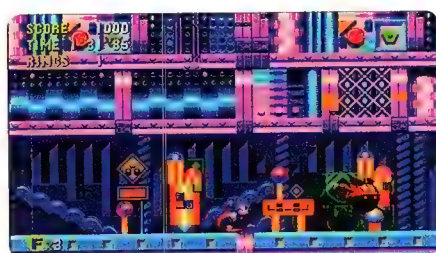
60

Sound
Sounds very retro, sound effects minimal.

65

Overall
Great fan-service, but it's aged poorly.

56%





We look at the game by a now-dead dev studio that has finally made it to PC.

L.A. Noire was first released halfway through last year – and reviewed quite averagely (www.atomicmpc.com.au/?264387). Though not stellar, we thought the game was worth a second look when it was announced that it would be ported to PC. After first checking that no, the sky was not falling in and a Rockstar game was actually coming to PC after all, we grabbed a retail copy of the game from Rockstar to see what had changed, and what hadn't.

Most notable about the installation process is that the game requires two discs, which isn't really saying too much in this day and age. We did have to opt out of creating a Rockstar Social Club profile numerous times, with many a warning that we'd be missing out on super-fun and super-special super-features, but eventually could create a default profile that did not require use of the service. As the case with practically all modern games we were forced to wait at initial startup for a patch to be applied, and finally got to jump into the fedora of the not-quite-detective-yet Cole Phelps.

Still flawed

At first impressions, L.A. Noire could be mistaken for a GTA clone. Certainly the world feels very similar, as the game makes use of the same technologies used in GTA IV, and the HUD elements are practically identical – even down to the GPS minimap (how they got this functioning in 1947 is unknown, but amusing). Control scheme on the PC is quite simple, using WASD for movement and the mouse for aiming, with shift for a faster paced jog.

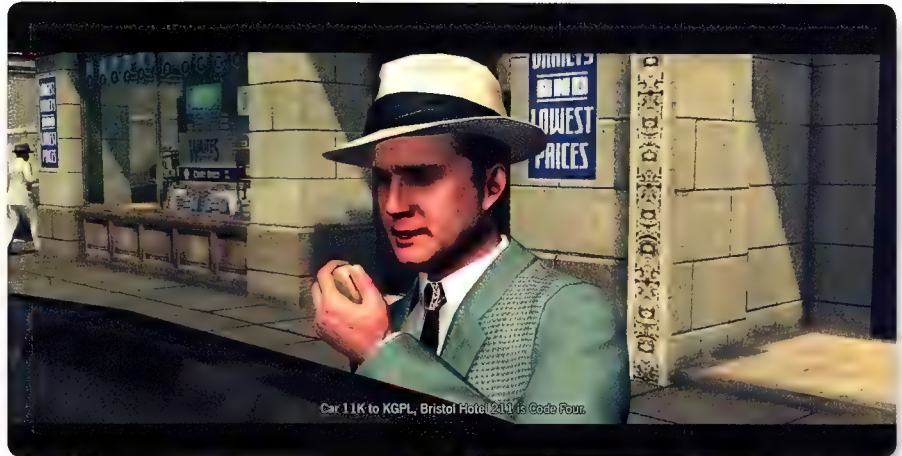
Unfortunately, the initial moments of the game were rather spoiled by horrendous performance – many times chugging like a PowerPoint presentation – and a queer fog that kicked in after 20 in-game metres that obscured detail beyond that distance. This was mostly fixed by updating graphics drivers to the latest version, but performance was still slow and prone to dips whenever action occurred.

Adding insult to injury was a slew of new bugs that cropped up during gameplay, where traffic would disappear at random instances – we'd be driving along, and suddenly the cars ahead of us would not be there. Texture pop-in is distracting; model pop-out is just as much so. There were

also serious problems with mirrored surfaces reflecting a static image of the room behind us, which tore into blue-grey when we attempted to move around the room. Add in weird animations to open doors, with hands passing through solid metal, and our immersion was broken quite often.

Immersion breakage was not limited to graphics; NPCs on the street would spout a handful of moronic phrases every time we walked past – apparently half the male population thinks nothing but "She wants a five-star wedding", and if we ever hear someone complaining about the length of the word 'abbreviation' again, we'll jump off a cliff.





But you're a detective, right?

Well sure, sort-of. Once we'd gotten L.A. Noire to a just-functional state, we drove the clunky police car and wrestled with the horrendous camera to the first destination, the first case of the game. There had been a murder, and it was up to Phelps and his partner at the time to find clues (his name isn't important as none of the partners actually do that much). Though we were told that we'd hear musical prompts whenever we approached these useful clues, we noticed nothing of the sort, and just resorted to left-clicking on anything vaguely interesting to find them. Eventually, after looking at every empty beer bottle in the alleyway, we wandered around and were told to climb up a drainpipe, the minimap proudly declaring that there was a clue up there. We did so, and wandered around the completely barren roof, before climbing down and being told to get up again. Huh?

Eventually we got bored of that and climbed back down to have a wander through the alleyway, and somehow stumbled upon a clue that was above – an open window, in which could be seen the reflection of a revolver. Lo and behold, climbing up the drainpipe revealed the revolver that had materialised out of nowhere,

and we were allowed to progress. To say this is linear is an understatement; you have to complete each case in an arbitrary order to get anywhere in the game.

Get some face in your face

What follows is a mostly-boring process of driving to the next point in the story, ultimately leading to the interesting part of the game – the interview process. Using the gathered evidence (in the form of clues), questions are asked to witnesses and suspects, who then respond and must be judged on the authenticity of their answer. The facial animation system is astounding in its accuracy; when people talk, it's not just that their mouths are flapping while you hear audio, but as if they are actually pronouncing each syllable. Of course when it comes to telling if someone is guilty this is inherently useful; L.A. Noire makes it into somewhat of a mockery when the suspect stops talking and pulls a face that screams "I'M GUILTY DAMNIT".

Deciding that you think they're guilty is the easy part, but knowing how to respond is the bit that feels like Russian Roulette. The three responses to each suspect's answer are Truth, where you take what they said at face value nicely; Doubt, where you accuse them of being

a woman-beating double Hitler and threaten all kinds of horrendous jail sentences; and Lie, where you accuse them of lying and must choose evidence to prove them wrong.

This sounds like it could have depth, but there is only ever one 'right' answer, and reaching that is a linear affair that takes much of the cerebral nature out of detective work. We played with a friend, taking turns, and found it more fun to attempt to guess what would happen next than to actually discover it for ourselves. Of course you can still get through the game making wrong choices and responses, and ultimately wind up at the end – you just won't have as much fun.

Fun is thin on the ground at the best of times, however, and most of the game boils down to travelling between locations to progress in the storyline. There are 40 'street crime' events to complete that present themselves at random times, but these usually amount to chasing a suspect and shooting them (sometimes to incapacitate, other times to just blow their head off), or finding a gang and shooting them. Yup, Phelps is a crim-murdering machine.

L.A. Noire isn't terrible, but its only redeeming feature is the facial animation and relatively accurate world – and we don't think it's worth the hassle to get it running properly. **JR**



PC, PS3, 360 (reviewed on PC)

Developer Team Bondi
Publisher Rockstar
Website www.rockstargames.com/lanoire

Gameplay

Interesting interview mechanic, boring driving.

65

Graphics

Look good when they work, some broken animations.

50

Sound

Generally good, but repetitive.

75



Overall
It reeks of console port, but fun may still be had.

61%



A puzzle action side-scroller wrapped in colour and fun.

Games are inherently more expensive the more complex they become. The larger the scope, the more freedoms you give the player, and the level of visual fidelity you aim for all add up to make for a game that is proportionately more expensive based on those very choices. For big companies such as EA or Activision, these are the kinds of titles chosen – based on existing IP, they are very often a safe bet, and can consume hundreds of thousands of dollars without batting an eyelid.

However for concepts that haven't quite been proven, and for ideas that may be workable with certain restrictions, launching a game can be done by a smaller studio with a smaller budget. Such was the origins of the original Trine; developer Frozenbyte created a world from scratch, and gave it life with whatever resources they had – resulting in a novel and visually splendid side-scrolling game that went on to have reasonable success on the PC via Steam, and eventually other distribution methods. This success is what gave them the funding for the game you're reading this review about, so let's start with some backstory.

What is a Trine, anyhow?

Trine, as a definition, means a third, and is generally used in Astrology to describe angles between two bodies in the sky. Trine, in the game, is a somewhat unexplained object that encapsulates the souls of three characters from very different backgrounds, forcibly joining them together in a quest for whatever it decides is important at the time. For the first game this

involved a circuitous path to defeating an ancient king; for the second, it is again another long trek, but interspersed with other minor destinations to keep it from feeling like a slog.

The three characters that are abducted by the magical object early in Trine 2 are Amadeus the Wizard, Pontius the Knight, and Zoya the Thief. Each of these three have different abilities, but one common attribute is their cheesy dialogue – Pontius is just as likely to fantasise about gigantic strawberries as he is to bellow war cries in combat. They also share a similar control scheme: WASD for movement, spacebar

for jump, left-click for primary and right-click for secondary. Trine 2 slowly introduces each character one at a time as the Trine recruits them, though their abilities are only truly powerful when used in harmony with each other.

Amadeus, being a Wizard and otherwise physically weak spellcaster, spends much of the time complaining about impending danger and worrying about his children at home; more usefully, he is able to conjure up boxes out of thin air to enable easier passage through the obstacles that litter the path, and can also levitate certain inanimate objects. A mechanic



that was mentioned during the tutorial section of the game was the ability to destroy spawned boxes by pointing at them and pressing what looked very much like the '2' button – but as buttons 1, 2 and 3 switch between the three characters, it really didn't help so much. Eventually a check of the control settings let us work out that it was the 'Q' button, and was all down to a very unhelpful font.

The Wizard is relatively useless on his own against any enemies that rear their ugly heads along the way, which is where the Knight comes in handy. He's quite literally only useful for attacking enemies with crushy and stabby things, and his sword and shield are made use of at regular intervals along the path. Fights are never really difficult, as enemies can only surround you on two sides, but provide some break to the repetition of solving puzzles and platforming – most of those problems are the domain of Zoya, who could've easily been in an Assassin's Creed game in another life.

She's armed with a bow that slowly fires arrows, and is later upgradeable to freeze enemies or set them on fire, but her health is quite miniscule in comparison to Pontius, and her main focus is navigating the world of Trine 2. Her special ability is a piston, which is used in a similar fashion to the rope tool in any Worms game, allowing her to swing around platforms and reach heights the other two characters can't. She requires very precise fingerbatics to control, and delicate movements can prove frustrating for those with little patience.

Me, me and me

As mentioned, switching between these characters is quick and simple; they each have individual health meters, and if all three expire, the game restarts from a checkpoint. Health vials litter the levels to replenish health, but the easiest way to heal up is to merely touch a checkpoint – reviving downed characters and restoring to full health. Checkpoints are awfully frequent, so we never felt like we were in too much trouble.



Puzzles present themselves throughout the journey with consistent frequency, and generally are linear in their difficulty as you progress through the game. Most are physics-based, requiring the redirection of water by altering channels mounted to a pivot, or the manipulation of objects to prop up a broken bridge to allow passage over a chasm. The original Trine quickly became frustrating when puzzles were not immediately solvable as characters had Mana and their abilities would not function without it; Trine 2 removes this requirement and all abilities are unrestricted. This makes for a more enjoyable experience, and gives the freedom to create unorthodox solutions to problems – even when the game clearly has a "right" solution, there are unintended ways around that to continue to progress.

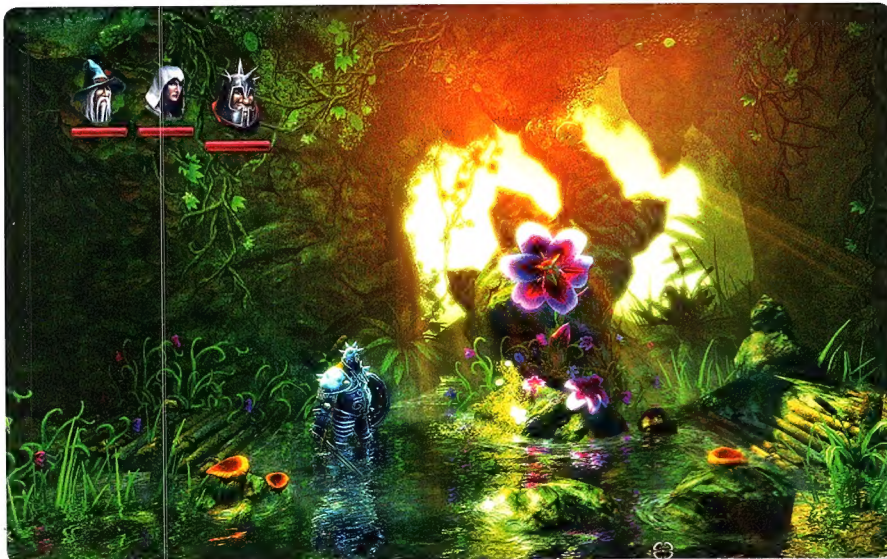
Boss fights occur every hour or so, and are usually an exercise in stupidity as we reverted to trial and error to defeat them. We spent ten minutes with a large snake attempting to remove it from the plain of the living, until stumbling

upon the unintuitive solution. For the most part, however, they act as a way to bring a level to a close, and are over quick enough. Trine 2 is fun to play, and it is very rewarding to solve the puzzles as you progress.

So shiny...

Perhaps the most impressive part of the whole game, aside from the fun platforming puzzle aspect, is the perfection that is the graphical quality. Every screenshot you see on this page was captured for this review running at full settings on a PC, and the bright primary colours and strong art design work harmoniously together to create a breathtakingly beautiful game. It's intentionally cartoony, but there's a sense of delight in exploring new levels and seeing the next environment.

Trine 2 runs a mere \$15 and provides a lot of fun for the small amount of money; it's an essential purchase for those who enjoyed the original, and is certainly recommended for those who enjoy a good puzzle action game every now and then. **JR**



PC, OSX, XBLA, PSN, Linux

Developer Frozenbyte
Publisher Atlus
Website <http://trine2.com>

Gameplay
Varied and mostly fun, with some clever puzzles.

85

Graphics
Amazingly pretty.

95

Sound
Goofy voicework and forgettable soundtrack.

60

Overall
It may be from a small dev, but Trine 2 is a great title.

85%

Tarnished Reputation

Like most gamers, Ben Mansill reckons 2011 was one of the best ever, but will equally be remembered as one where heroes fell.

There are few companies in gaming, and fewer individuals, that possess seemingly-unassailable virtue. They are the do-no-wrong elite; we know they will always get it right. They are the purest of the pure, they dictate what's cool without trying, and they stand atop great games; but the goodness spreads beyond just quality software – every word uttered is gold, and in the rarest moments when they pass comment on someone else that's just screwed up, it's taken as holy chastisement.

Oddly enough, 2011 was a year when these supremos messed up. Some a little bit, some a lot. Their stock is lower as a result, and we're poorer as a whole by simply having fewer paragons to hold up high.

Making an honest mistake is one thing, but what we saw was malicious evil from quarters least expected. In the fallout, the reactions were human nature at its finest – and I do mean that. The explanations given were that this or that was an oversight, rogue employees, or that the situation was beyond their control. While that's barely preferable to denial, I don't buy it. What we saw was the bastard side of someone/thing we loved, and that hurts deep down.

Carmack had relegated the PC version to a lower rung on the ladder, betraying the followers who had held him up on high

John Carmack committed two evils. Sins against everything he stood for and was upheld for. He gave PC gaming the finger by making Rage a game that only worked well on console, and he doubled the sin by destroying our perception of him as a master of quality code.

Whether explicitly stated or not, we all believed that Rage was a PC-first game through development, and PC gamers graciously sniggered that the console versions would be a second-rate port of the PC game. "Bzzt" Wrong: it turned out to be the other way around. Carmack had relegated the PC version to a lower rung on the ladder, betraying the followers in his Church of Carmack who had held him up on high as the champion of PC gaming. How could he consider Rage's PC performance "acceptable"? How could he sign it off for release? Had his coding magic abandoned him? Had he abandoned us? Five years of development for this?

I blame Carmack for this, not the greater ID. His standards of excellence are well established.

PC Rage was an act of wilful evil, and his golden reputation is now forever tarnished.

Valve are golden. They are cool, they set standards of ethics and quality. They do no evil, and are above any cheap shenanigans.

The Potato Sack episode undid all that, for me at least. I know many thought the event was cool, but all I saw was a company wilfully trading in its reputation for sales to a crowd that trusted in them completely. The campaign suckered gamers around the globe into purchasing games they wouldn't have otherwise, then dedicate their time playing them to see Portal 2 released early. It looked like fun with the ever-updating progress page showing how many spud 'achievements' were needed and how soon Portal 2 would be released as a consequence.

But as it turned out, the actual release was only brought forward a matter of hours. It was very clever marketing, it amped up the anticipation for Portal 2, and it sold a truckload of games that were well past their shelf life. Gee thanks Valve.

Blizzard = cool, or not? The dreadful homophobic rant at Blizzcon (seen online at Kotaku: <http://tinyurl.com/blizzcon-phobia>),

had a fanatically loyal following. Gamers trusted Paradox. Paradox took that trust, manipulated it, and turned it into money.

Their calculated risk was that most fans would buy the game and then sit and wait while the company 'finished' the game bit by bit through patches. It wasn't even slightly playable on release, it was completely useless – and they knew it.

Paradox staff eventually fessed up and claimed that this move was necessary, or else the company would have folded and there'd be no SotS 2 at all. We've all seen games released with bugs here and there, but this was an extreme new manifestation of that developer mindset. It is in fact an entirely new business model for the industry. And it is evil evil evil.

It's such a pity that we had to realise that our heroes were imperfect. Time will heal the wounds, but it was a nasty realisation that speeches promising quality and assuring high ethical standards were just that – words.

and the subsequent attempts to play it down and ultimately apologise, permanently tarnished the company and further fuelled the silly 'Horde kicks Alliance butt' gang mindset.

It showed the company lived in a bubble filled with only its own ego. When you're the King of the World you may be fooled into thinking that anything you do will be slavishly embraced by your followers. The aftermath was a reality-shock Blizzard probably needed.

While the above offenders are big names, the worst act of evil this year goes to a small dev, but with just as much goodwill. So much so that they deliberately cashed-in a big chunk of this goodwill, monetising player faith in exchange for cashflow.

Sword of the Stars 2 was released by Paradox Interactive in an alpha state. It was then, and remains now, an incomplete game; yet the company knowingly put it out there, banking on its reputation for ongoing patch support to fix things. The original Sword of the Stars was patched and perfected over many years, and



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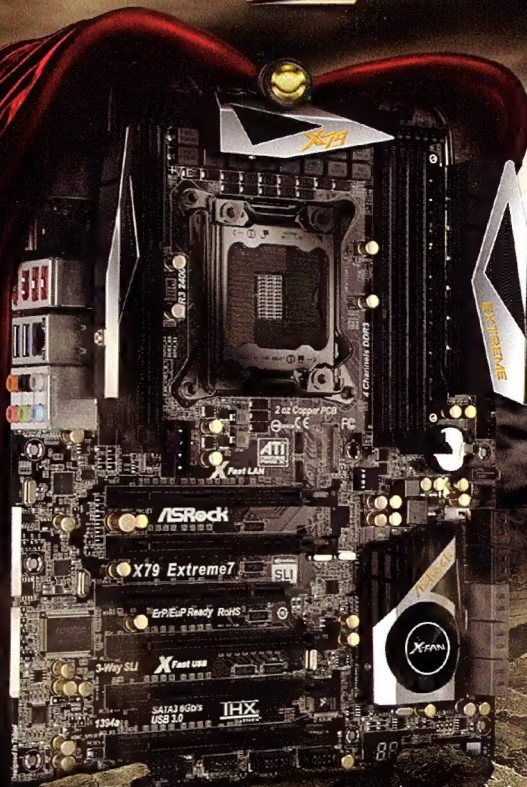
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